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THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, DUKE STREET, STAMFORD STREET, AND CHARING CROSS.

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SECOND SERIES.

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APPENDIX.

DIRECTIONS TO THE BINDER.

The Binder is desired to collect together all the Appendix matter, with Roman numeral folios, and place it at the *end* of each volume of the Journal, excepting Titles and Contents, and Statistics &c., which are in all cases to be placed at the *beginning* of the Volume: the lettering at the back to include a statement of the *year* as well as the *volume;* the first volume belonging to 1839–40, the second to 1841, the third to 1842, the fourth to 1843, and so on.

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VITAL STATISTICS:—POPULATION; BIRTHS; DEATHS; EMIGRATION; METEOROLOGY; IMPORTATIONS OF GRAIN; SALES OF BRITISH WHEAT; PRICES OF CORN, &c.; AND PAUPERISM.

[*The facts are derived chiefly from the Reports of the* REGISTRAR-GENERAL; *the Meteorological Reports of* MR. GLAISHER; *the Returns of the* BOARD OF TRADE, *and the* INSPECTOR-GENERAL OF IMPORTS AND EXPORTS.]

GREAT BRITAIN AND IRELAND, 1868.

THE estimated Population of the United Kingdom at the middle of the year 1868 was 30,369,845; viz., England and Wales, 21,649,377; Scotland, 3,188,125; and Ireland, 5,532,343. In the year under review, 1,047,859 births and 636,881 deaths were registered; thus making the natural increase 410,978, or, after correction for defective registration in Ireland, 1177 daily. The recorded number of emigrants of home origin was 142,731, or 391 daily. The difference between the emigrants and the corrected natural increase was 786 daily.

In the year 1868, 58,268 of the English people, 14,954 of the Scotch, 64,961 of the Irish people, 51,956 foreigners, and 6182 persons of origin not distinguished in the returns, left ports of the United Kingdom for foreign and colonial settlements. They constituted a total emigration of 196,321 persons, of whom 155,532 went to the United States. The emigration of 1868 was smaller than in any of the four years 8361–66, but exceeded that of 1867 by about 368.

ENGLAND AND WALES.

In 1868 the birth-rate in England was 36·31 to 1000 persons living; the death-rate, 22·20. The former was above the average, the latter was near, but below it.

The death-rate experienced by the people inhabiting districts that comprise the chief towns was 24·22 per 1000 of population; while the death-rate of persons residing in districts comprising small towns and country parishes was 19·40 per 1000. The average death-rates of town and chiefly rural districts are respectively 24·56 and 20·14 per 1000 living.

The south-western counties were the healthiest in 1868, for in these the rate of mortality was only 18 per 1000. In the south-eastern counties it was 19; in the eastern and south-midland counties and in Monmouthshire and Wales it was 20; in the west-midland and north-midland counties, 21; in London and the northern counties, 24; in Yorkshire, 25; and in the north-western counties (viz. Cheshire and Lancashire), 26.

In the third quarter of the year the deaths were in excess; the high temperature gave activity in air and water to the lower forms of life, and consequently to the zymotic elements of diarrhœa, summer cholera, and scarlatina. In the fourth quarter, many places in the south of England suffered severely from scarlet fever; this disease was epidemical, and in the Lancashire and Yorkshire districts it proved a fatal scourge.

Births and Deaths in 1868 in England.

	Births in 1868.	Annual Birth-rate to 1000 persons living (1868).	Average Birth-rate to 1000 persons living (1858-67).
First Quarter: Jan., Feb., March ..	198,894	36·94	36·74
Second Quarter: April, May, June ..	202,492	37·64	36·37
Third Quarter: July, Aug., Sept. ..	192,56	35·23	33·71
Fourth Quarter: Oct., Nov., Dec. ..	192,203	35·09	33·47
Year	786,156	36·31	35·08
	Deaths in 1868.	**Annual Death-rate to 1000 persons living (1868).**	**Average Death-rate to 1000 persons living (1858-67).**
First Quarter: Jan., Feb., March ..	120,095	22·34	25·76
Second Quarter: April, May, June ..	109,984	20·40	22·20
Third Quarter: July, Aug., Sept. ..	130,502	23·89	20·24
Fourth Quarter: Oct., Nov., Dec. ..	120,096	21·93	22·11
Year	480,677	22·20	22·57

A glance at the results of registration for the year 1868 shows that the first two quarters were favourable to life; but the gains of winter and spring were sacrificed by the fatality of the third quarter of the year. The heat in summer was for several days tropical, and of water which is required by the population of the country for drink and for domestic purposes every day, the quantity was greatly insufficient. As rain only falls at intervals, it is evident that the constant supply can only be secured by natural or by artificial storage of the water in rivers, lakes, ponds, under or above ground. At present,

many of these water reservoirs fall off, or fail altogether, after a certain number of days of drought; and the water supplied is limited in quantity, and often deteriorated in quality, for the constant undiluted impurities become more and more noxious every day to man and beast. The first lesson of the summer season is the urgency of providing ample storage for the flood-waters about the river-heads, and for the rain-fall on houses, so as to equalise the distribution over the days of the year. The second lesson is the necessity of measures for the removal and interment of every kind of fermenting impurity. The diarrhœas, choleras, and analogous diseases, which spoil the enjoyment of the finest summers, will then be as rare in those days as the early migrating birds; for, finding nothing to feed upon, they will infest our cities and villages no longer. In the fourth quarter of the year the great centres of population in the north of the kingdom made a bad return. Why should industrious, prosperous, and wealthy communities see their people perish year after year at excessively high death-rates without trying some radical and effectual measures of reform? There appear to be disputes as to the particular measures to be adopted, and while these are going on the people are dying off at high rates. Why should not experiments be at once made in various blocks of houses? The water supply is an excellent preliminary, but the sewers must follow. The refuse must be day by day removed from the dwellings, and this the householder cannot himself accomplish in large towns. It is municipal work.

METEOROLOGY.

Third Quarter (July, August, September). The weather during the whole quarter was of the same character as in the preceding quarter, viz., remarkably fine and warm. The month of July was excessively warm; on the 22nd of this month the thermometer in the shade rose to 96·6°, the highest temperature of the air ever recorded at Greenwich. In the beginning of August the temperature was high; on the 5th the maximum temperature was 90½°. The mean for the month was high, but not remarkably so; it was 63·6°. The month of September was warm throughout, particularly at the beginning; the mean for the month was 3·4° above the average. The mean temperature of the three months was 63·9°—a result which has never been recorded in any corresponding quarter for 98 years.

At the end of the month of July the harvest was progressing in almost every part of the British Isles, and in some of the southern districts was brought near to completion. Harvest came in suddenly

and simultaneously in all parts of the country, and the crops proved to be in such a perfect state that cutting, carrying, thrashing, and grinding into flour followed in rapid succession. There were many sudden deaths from sunstroke during the month. The want of water was severely felt, and this, combined with the great heat, acted injuriously both on animal and vegetable life to an extent unprecedented. Pastures and grass-lands were generally brown and bare, in many places not a blade of grass was to be seen. At the end of August the harvest was nearly completed; pastures and grass-lands, under welcome showers, resumed their ordinary verdant appearance; the rain-fall changed the appearance of the fields in a very short time, and root-crops were benefited by the moisture. The month of September was favourable to agricultural pursuits. Towards the end of the month heavy rain fell all over the country and brought general relief to animal and vegetable life. Ponds and wells re-commenced to yield their usual supply of water; streams and currents were filled. The rain loosened the ground for the plough, and the potato crop was upon the whole spoken of with satisfaction. The fall of rain was 1·3 in. in defect in both July and September, and 0·1 in. in excess in August. The rain-fall for the quarter was only 5·1 in., whereas the average summer fall at Greenwich is 7·6 in. The mean summer fall of rain is 767 tons to an acre of land, so the deficiency was 252 tons an acre.

Wheat was cut on the 7th July at Weybridge; on the 8th at Norwood; on the 10th at Worthing and Cardington; on the 13th at Strathfield Turgiss, Hawarden, and in Kent generally; on the 14th at Osborne and Eastbourne; on the 16th at Guernsey and Boston; on the 17th at Helston; on the 20th at Holkham; on the 24th at Hull; and on the 27th at Carlisle; on the 8th August at Miltown and Culloden.

Oats were cut on the 6th July at Weybridge; on the 9th at Guernsey; on the 11th at Boston; on the 13th at Helston; on the 24th at Carlisle; on the 27th at Strathfield Turgiss; and on the 31st at Culloden; on the 4th August at Miltown.

Barley was cut on the 3rd July at Worthing; on the 9th at Guernsey and Weybridge; on the 13th at Helston; on the 20th at Cardington; and on the 22nd at Carlisle. On the 6th August at Strathfield Turgiss; on the 10th at Culloden; and on the 12th at Miltown.

Fourth Quarter (*October*, *November*, *December*). The weather presented many peculiarities; the mean temperature of the air fell from 47·9° in October to 41·5° in November; but in December this was reversed, and the mean temperature of the last month of the year

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE LAST SIX MONTHS OF THE YEAR 1868.

1868. MONTHS.	Temperature of									Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.		Water of the Thames.			
	Mean.	Diff. from average of 97 years.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.		Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	grs.
July	67·5	+6·1	+5·9	60·3	+3·0	54·6	+1·0	26·3	+5·5	67·9	0·427	+0·015	4·7	+0·1
August ..	63·6	+2·9	+2·4	58·7	+1·4	54·5	+0·7	20·1	+0·5	65·9	0·425	+0·007	4·7	+0·1
September ..	60·5	+4·0	+3·4	56·1	+2·1	52·2	+1·1	20·6	+2·1	60·8	0·391	+0·010	4·4	+0·2
Mean ..	63·9	+4·3	+3·9	58·4	+2·2	53·8	+0·9	22·3	+2·7	64·9	0·414	+0·011	4·6	+0·1
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
October ..	47·9	−1·8	−2·6	46·2	−2·3	44·4	−2·0	16·7	+2·1	50·8	0·293	−0·024	3·3	−0·4
November ..	41·5	−0·9	−2·5	39·8	−1·8	37·6	−2·2	10·8	−1·0	43·4	0·225	−0·026	2·6	−0·2
December ..	46·0	+6·9	+5·6	44·6	+5·7	43·1	+6·0	9·4	−0·2	44·0	0·278	+0·055	3·2	+0·6
Mean ..	45·1	+1·4	+0·2	43·5	+1·5	41·7	+0·6	12·3	+0·3	46·1	0·265	+0·002	3·0	0·0

NOTE.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

Meteorological Observations recorded at the Royal Observatory, Greenwich, in the Last Six Months of the Year 1868.

1868. Months.	Degree of Humidity. Mean.	Degree of Humidity. Diff. from average of 27 years.	Reading of Barometer. Mean.	Reading of Barometer. Diff. from average of 27 years.	Weight of a Cubic Foot of Air. Mean.	Weight of a Cubic Foot of Air. Diff. from average of 27 years.	Rain. Amount.	Rain. Diff. from average of 53 years.	Daily Horizontal movement of the Air.	Reading of Thermometer on Grass. Number of Nights it was At or below 30°.	Between 30° and 40°.	Above 40°.	Lowest Reading at Night.	Highest Reading at Night.
			in.	in.	grs.	grs.	in.	in.	Miles.				°	°
July	63	−13	29·891	+0·092	524	− 4	1·1	−1·3	229	0	1	30	39·4	60·0
August ..	73	− 4	29·736	−0·050	526	− 3	2·5	+0·1	264	0	2	29	38·8	60·0
September ..	74	− 7	29·693	−0·128	528	− 6	1·5	−1·3	240	0	3	27	34·1	54·8
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	70	− 8	29·773	−0·029	526	− 4	5·1	−2·5	244	0	6	86	34·1	60·0
			in.	in.	grs.	grs.	in.	in.	Miles				°	°
October ..	88	+ 1	29·792	+0·095	543	+ 4	2·6	−0·2	266	6	21	4	20·5	46·5
November ..	87	− 1	29·836	+0·073	552	− 4	1·2	−1·2	284	13	16	1	18·0	47·5
December ..	90	+ 2	29·379	−0·452	538	−14	5·4	+3·5	412	4	14	13	25·0	47·0
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	88	+ 1	29·669	−0·095	544	− 5	9·2	+2·1	321	23	51	18	18·0	47·5

Note.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

year was 46·0°. The very long period of warm weather which had prevailed from January 12th to September 30th changed to cold on October 1st, and during the months of October and November the temperature of the air, with the exception of a few slightly warm days, was generally below its average for the season. For the 61 days ending November 30th, the average daily deficiency of temperature was 2°. On December 1st the mean temperature was at its average; on the 2nd it passed above the average, and so continued throughout the month—with the exception of the 11th day, when it was slightly in defect,—and the excess of mean daily temperature was as large as 5½° over the average of 50 years. The average temperature of the excessively warm month of December was only exceeded twice in the period of 98 years. The fall of rain was also exceptional in this month, the amount collected was nearly 5½ in., being the greatest in any December as far back as the record at the Royal Observatory at Greenwich extends.

The swallows departed from Eastbourne, on the south coast, on October 6th; and lingered at Osborne, in the Isle of Wight, until November 12th, at Holkham, on the east coast, until November 11th. Woodcocks continued to arrive between October 6th and November 5th.

CORN: Importations, Sales, and Prices.

Quantities of Wheat, Wheatmeal and Flour, Barley, Oats, Peas and Beans, Imported into the United Kingdom in the Year 1868; and in each of the Last Six Months of the Year 1868.

1868.	Wheat.	Wheatmeal and Flour.	Barley.	Oats.	Peas.	Beans.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
In first Six Months	17,696,503	1,427,022	2,586,529	3,486,392	396,801	1,097,691
July	3,010,288	262,425	697,063	1,266,131	94,300	248,460
August ..	2,012,374	134,931	564,324	1,037,314	73,232	191,871
September .	2,259,430	264,309	834,685	740,515	51,558	322,474
October ..	2,686,613	336,921	839,727	512,167	118,887	347,606
November .	2,847,285	338,660	968,414	617,725	162,806	255,795
December .	2,127,275	328,554	985,482	452,319	218,662	183,493
In last Six Months	14,943,265	1,666,000	4,889,695	4,626,171	719,445	1,549,699
Year ..	32,639,768	3,093,022	7,476,224	8,112,563	1,116,246	2,647,390

Note.—The average weights *per quarter* of corn, as adopted in the office of the Inspector-General of Imports and Exports, are as follows:—For wheat, 485⅓ lbs., or 4⅓ cwts.; for barley, 400 lbs., or 3$\frac{4}{7}$ cwts.; for oats, 308 lbs., or 2¾ cwts. Corn has been entered and charged with duty by *weight* instead of *measure* since September, 1864.

Quantities of Wheat, Barley, Oats, Peas, Beans, Indian Corn or Maize, Wheatmeal and Flour, Imported in the Three Years 1866-8; also the Countries from which the Wheat, Wheatmeal and Flour were obtained.

	1866.	1867.	1868.
Wheat from—	cwts.	cwts.	cwts.
Russia	8,937,199	14,025,236	10,053,617
Denmark	506,236	418,012	654,419
Prussia	4,401,409	5,572,263	4,584,742
Schleswig, Holstein, and Lauenburg	187,938	127,222	45,412
Mecklenburg	733,571	651,884	647,205
Hanse Towns	878,912	700,935	756,654
France	3,473,130	597,405	56,414
Turkey and Wallachia and Moldavia	528,433	2,446,638	3,049,088
Egypt	33,831	1,451,774	3,219,536
United States	635,239	4,188,013	5,908,149
British North America	8,789	683,127	557,443
Other countries	2,831,642	3,783,060	3,107,089
Total Wheat	23,156,329	34,645,569	32,639,768
Barley	8,433,863	5,683,721	7,476,224
Oats	8,844,586	9,407,136	8,112,563
Peas	1,211,835	1,586,129	1,116,246
Beans	1,324,173	1,982,615	2,647,390
Indian Corn, or Maize	14,322,863	8,540,429	11,472,226
Wheatmeal and Flour from—			
Hanse Towns	347,012	444,710	615,756
France	3,640,320	1,234,742	632,359
United States	280,792	722,976	676,192
British North America	40,650	121,503	192,850
Other countries	663,506	1,069,038	975,865
Total Wheatmeal and Flour	4,972,280	3,592,969	3,093,022

Computed Real Value of Corn Imported in the Eleven Months (ended November 30th) of 1868.

The value of wheat imported in eleven months was 20,877,292*l.*, which is 1,225,592*l.* less than the value of the quantity imported in the same period of 1867, but 9,662,610*l.* more than that in 1866, when the value of the quantity imported in the eleven months was only 11,214,682*l.*

The value of wheat-meal and flour was 2,585.249*l.*, which is 355,678*l.* less than the value imported in the eleven months of 1867, and 662,802*l.* less than that of 1866.

The value of barley imported in eleven months of 1868 was 3,291,360, against 2,643,325*l.* in 1867, and 3,062,156*l.* in 1866.

The value of oats was 3,656,275*l.*, against 3,963,933*l.* in 1867, and 3,251,657*l.* in 1866.

QUANTITIES of BRITISH WHEAT SOLD in the Towns from which Returns are received under the Act of the 27th and 28th VICTORIA, cap. 87, and their AVERAGE PRICES, in each of the Last SIX MONTHS of the Years 1863-68.

	QUANTITIES IN QUARTERS.					
	1863.	1864.	1865.	1866.	1867.	1868.
	quarters.	quarters.	quarters.	quarters.	quarters.	quarters.
Seventh month	162,817	257,510	222,961	127,836	109,829	106,812
Eighth month	187,011	264,939	201,953	191,057	102,303	174,633
Ninth month (five weeks)	390,308	322,292	318,893	325,056	265,668	444,296
Tenth month ..	333,609	311,169	304,054	320,674	349,788	284,810
Eleventh month	325,209	302,446	295,632	284,530	265,622	268,848
Twelfth month (five weeks)	472,876	399,358	391,941	332,934	301,558	307,386

	AVERAGE PRICES PER QUARTER.											
	1863.		1864.		1865.		1866.		1867.		1868.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Seventh month	46	7	42	0	42	10	54	1	65	1	65	6
Eighth month	46	2	43	7	43	3	50	7	68	0	57	9
Ninth month (five weeks)	44	6	42	0	44	0	49	0	63	5	55	1
Tenth month ..	40	10	38	9	41	10	52	4	66	7	53	11
Eleventh month	39	11	38	10	45	7	56	6	69	9	52	2
Twelfth month (five weeks)	40	9	38	3	46	8	60	3	67	7	50	2

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS per Quarter (Imperial Measure) as received from the INSPECTORS and OFFICERS of EXCISE according to the Act of 27th and 28th VICTORIA, cap. 87, in each of the Last TWENTY-SIX WEEKS of the Year 1868.

Week ending	Wheat.		Barley.		Oats.		Week ending	Wheat.		Barley.		Oats.	
	s.	d.	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
July 4	67	7	39	5	29	5	October 3 ..	54	4	44	9	26	11
July 11 ..	66	7	37	4	29	8	October 10	54	3	45	2	27	9
July 18 ..	65	0	37	4	30	11	October 17	53	8	45	7	27	1
July 25 ..	62	9	35	8	31	4	October 24	53	4	45	11	28	11
August 1 ..	61	1	39	3	30	5	October 31	52	11	46	1	28	0
August 8 ..	57	11	41	4	29	9	November 7	52	3	46	7	28	5
August 15 ..	55	0	42	0	30	4	November 14	52	0	46	9	28	0
August 22 ..	57	1	41	4	29	2	November 21	51	6	47	3	28	4
August 29 ..	56	11	41	7	29	3	November 28	51	0	47	0	27	4
September 5	55	3	42	9	28	10	December 5	50	1	46	3	29	8
September 12	55	5	43	8	28	3	December 12	49	8	45	9	27	3
September 19	54	4	44	0	28	5	December 19	49	5	45	3	27	7
September 26	53	7	44	4	26	8	December 26	50	7	46	1	26	2
Average of Summer Quarter	59	1	40	9	29	5	Average of Autumn Quarter	51	11	46	0	27	9

The AVERAGE PRICES of Consols, of Wheat, of Meat, and of Potatoes; also the AVERAGE NUMBER of PAUPERS relieved on the *last day* of each Week; and the MEAN TEMPERATURE, in each of the Twelve Quarters ending December 31st, 1868.

Quarters ending	Average Prices.						Pauperism.		
	Consols (for Money).	Wheat per Quarter in England and Wales.		Meat per lb. at Leadenhall and Newgate Markets (by the Carcase).		Best Potatoes per Ton at Waterside Market, Southwark.	Quarterly Average of the Number of Paupers relieved on the *last day* of each week.		Mean Temperature.
				Beef.	Mutton.		In-door.	Out-door.	
1866	£.	*s.*	*d.*						°
Mar. 31	87	45	6	$4\frac{1}{2}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{5}{8}$*d.*	$5\frac{1}{2}$*d*—$7\frac{3}{4}$*d.* Mean $6\frac{5}{8}$*d.*	55*s.*—90*s.* Mean 72*s.* 6*d.*	139,546	759,402	41·2
June 30	$86\frac{4}{8}$	46	6	$4\frac{3}{4}$*d.*—7*d.* Mean $5\frac{7}{8}$*d.*	$5\frac{1}{2}$*d.*—$8\frac{1}{2}$*d.* Mean 7*d.*	60*s.*—95*s.* Mean 77*s.* 6*d.*	123,657	734,139	53·0
Sept. 30	$88\frac{3}{8}$	51	0	$5\frac{1}{4}$*d.*—$7\frac{1}{4}$*d.* Mean $6\frac{1}{8}$*d.*	$5\frac{1}{2}$*d.*—$8\frac{1}{4}$*d.* Mean $6\frac{3}{4}$*d.*	75*s.*—120*s.* Mean 97*s.* 6*d.*	120,955	717,553	58·9
Dec. 31	$89\frac{4}{8}$	56	8	$4\frac{3}{4}$*d.*—7*d.* Mean $5\frac{7}{8}$*d.*	$5\frac{1}{4}$*d.*—$7\frac{1}{2}$*d.* Mean $6\frac{3}{8}$*d.*	85*s.*—130*s.* Mean 107*s.* 6*d.*	133,979	734,312	46·2
1867									
Mar. 31	$90\frac{7}{8}$	60	7	$4\frac{3}{4}$*d.*—7*d.* Mean $5\frac{7}{8}$*d.*	5*d.*—$7\frac{1}{4}$*d.* Mean $6\frac{1}{8}$*d.*	115*s.*—160*s.* Mean 137*s.* 6*d.*	147,620	832,364	38·9
June 30	$92\frac{4}{8}$	64	0	$4\frac{3}{4}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{3}{4}$*d.*	$5\frac{1}{4}$*d.*—$7\frac{1}{4}$*d.* Mean $6\frac{1}{4}$*d.*	135*s.*—175*s.* Mean 155*s.*	134,678	779,629	53·5
Sept. 30	$94\frac{4}{8}$	65	4	$4\frac{3}{4}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{3}{4}$*d.*	5*d.*—7*d.* Mean 6*d.*	100*s.*—155*s.* Mean 127*s.* 6*d.*	129,838	743,977	59·7
Dec. 31	$94\frac{3}{8}$	67	11	$4\frac{1}{2}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{5}{8}$*d.*	$4\frac{1}{2}$*d.*—$6\frac{1}{2}$*d.* Mean $5\frac{1}{2}$*d.*	110*s.*—155*s.* Mean 132*s.* 6*d.*	146,237	771,230	42·5
1868									
Mar. 31	93	72	2	$4\frac{1}{4}$*d.*—$6\frac{1}{2}$*d.* Mean $5\frac{3}{8}$*d.*	$4\frac{1}{4}$*d.*—$6\frac{1}{2}$*d.* Mean $5\frac{3}{8}$*d.*	125*s.*—170*s.* Mean 147*s.* 6*d.*	159,716	860,165	41·4
June 30	$94\frac{3}{8}$	71	10	$4\frac{1}{2}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{5}{8}$*d.*	$4\frac{3}{4}$*d.*—7*d.* Mean $5\frac{7}{8}$*d.*	130*s.*—170*s.* Mean 150*s.*	142,588	800,944	55·8
Sept. 30	$94\frac{2}{8}$	59	1	$4\frac{1}{2}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{5}{8}$*d.*	$4\frac{3}{4}$*d.*—$6\frac{3}{4}$*d.* Mean $5\frac{3}{4}$*d.*	120*s.*—175*s.* Mean 147*s.* 6*d.*	138,284	778,804	63·9
Dec. 31	$94\frac{3}{8}$	51	11	$4\frac{1}{2}$*d.*—7*d.** Mean $5\frac{3}{4}$*d.*	$4\frac{1}{2}$*d.*—$6\frac{3}{4}$*d.** Mean $5\frac{5}{8}$*d.*	70*s.*—140*s.* Mean 105*s.*	153,958† (?)	813,130† (?)	45·1

* For the last four weeks of the quarter ending December 31st, 1868, the prices, from which the quarterly average is derived, are those quoted at the Smithfield Meat Market.

† The number of paupers in the receipt of in-door and out-door relief, has been estimated by the Poor Law Board.

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER, in each of the SIXTEEN YEARS 1853-68.

Year.	Wheat.		Barley.		Oats.		Year.	Wheat.		Barley.		Oats.	
	s.	d.	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
1853	53	3	33	2	21	0	1861	55	4	36	1	23	9
1854	72	5	36	0	27	11	1862	55	5	35	1	22	7
1855	74	8	34	9	27	5	1863	44	9	33	11	21	2
1856	69	2	41	1	25	2	1864	40	2	29	11	20	1
1857	56	4	42	1	25	0	1865	41	10	29	9	21	10
1858	44	2	34	8	24	6	1866	49	11	37	5	24	7
1859	43	9	33	6	23	2	1867	64	6	40	0	26	1
1860	53	3	36	7	24	5	1868	63	9	43	0	28	1

VITAL STATISTICS:—POPULATION; BIRTHS; DEATHS; EMIGRATION; METEOROLOGY; IMPORTATIONS OF GRAIN; SALES OF BRITISH WHEAT; PRICES OF CORN AND OTHER PRODUCE; AND PAUPERISM, &c.

[*The facts are derived chiefly from the Reports of the* REGISTRAR-GENERAL; *the Meteorological Reports of* Mr. GLAISHER; *the Returns of the* BOARD OF TRADE, *and the* INSPECTOR-GENERAL OF IMPORTS AND EXPORTS.]

POPULATION of the UNITED KINGDOM, estimated to the middle of the year 1869 (exclusive of islands in the British seas):—

Males	14,727,427
Females	15,894,004
Total	30,621,431

	England.	Scotland.	Ireland.
Males	10,546,829	1,511,203	2,669,395
Females	11,322,778	1,694,278	2,876,948
Total ..	21,869,607	3,205,481	5,546,343

ENGLAND AND WALES.

BIRTHS and DEATHS in the First Six Months of 1869.

Winter Quarter (January, February, March).—Births registered were 204,055. The annual birth-rate to 1000 living was 37·98; the average derived from ten corresponding winters of 1859-68 being 36·85.

Deaths registered were 133,437. The annual death-rate per 1000 of population was 24·84; the average derived from ten corresponding winters of 1859-68 being 25·36.

The annual mortality per 1000 of population experienced by the people inhabiting the chief towns was 26·55, the average being 27·24. In districts that comprise small towns, villages, and open country, it was 22·56, the average being 23·02.

The marriage-rate—which had been depressed for a period of two years—rallied in the first quarter of 1869, and implied increased confidence in the minds of the people in respect to their ability to earn a sufficient and comfortable subsistence. The births, after allowing for increase of population, were numerous beyond example. The death-rate was slightly below the average of the season; but

many places suffered severely from an epidemic of scarlet fever, and trying and exceptional climatic conditions prevailed, which swelled the number of deaths from bronchial affections, and cut off many of the very young, the weakly, and the aged. Potatoes were much cheaper than in the winter of 1868, but the prices of both beef and mutton were higher.

In the quarter under review 10,830 of the English people, 2622 of the Scotch, 9654 of the Irish people, 6550 foreigners, and 619 persons of origin not distinguished in the returns, left ports of the United Kingdom for foreign and colonial settlements. They constituted a total emigration of 30,275 souls, of whom 26,900 went to the United States. The number of emigrants was 4289 in excess of that in the winter of 1868.

Spring Quarter (*April*, *May*, *June*).—Births registered were 188,459. The annual birth-rate per 1000 of population was 34·61; the average of ten springs (1859-68) being 36·65.

Deaths registered were 118,849. The annual death-rate per 1000 of population was 21·83; the average of ten springs (1859-68) being 22·03.

The birth-rate was remarkably low, and trade in the iron and coal mining districts was so depressed that many workmen were compelled to seek new fields of labour. So low a birth-rate had not been recorded since 1847, and there are only three instances in the last twenty-one years which approximated to it, viz., in 1848, 1853, and 1858.

The death-rate was slightly below the average of the season; so a mild April, followed by a cold May and June, did not act very unfavourably on the public health. The annual rate of mortality in the population of the country districts was at the rate of 20·56 per 1000, the average rate being 20·32; while in the chief towns, where the inhabitants are in closer proximity to each other, the mortality was at the rate of 22·78, against an average of 23·39. The mortality of Liverpool was 27·29; that of Manchester, 24·99; and of Sheffield, 24·53 per 1000. In Bristol the rate was 21·61; and in Birmingham, 18·26 per 1000. The mortality of London has increased from 20·17 and 21·88 to 22·25 per 1000 in the three spring quarters of 1867-8-9. Recent analyses have proved that the waters of the Thames and Lea are still contaminated with sewage. The unsatisfactory state of the metropolitan water supply has been the subject of a report by a Royal Commission, who show the expediency and advantage of consolidating the water supply of London under public control, as in the case of Manchester, Glasgow, &c. Such an arrangement would, for many reasons, be very desirable; more especially as

affording the means of ensuring an effectual system of filtration. The deaths by small-pox and measles declined in London during the three months under review as compared with the same period of 1868, while the deaths from scarlet fever and whooping-cough increased.

The total number of emigrants in the quarter (ended 30th June) was 113,074. Of these, 30,839 were of English origin; 8256, Scotch; 34,739, Irish; 37,935 foreigners; and 1305 were persons whose origin was undistinguished. Of the total emigration, 89,361 persons went to the United States; 19,242 to North America; and 3670 to the Australian colonies.

METEOROLOGY.

Winter Quarter (*January, February, March*).—At Greenwich the months of January and February, with the exception of a short period extending from 19th to 25th of January, were remarkably warm. Up to March 1st the excess of temperature averaged more than $5\frac{1}{4}°$ daily. On March 2nd a change took place, and a period of cold and wintry weather set in, and continued until the end of the quarter. The average deficiency of temperature during this period exceeded 4° daily. The mean daily temperature of the quarter shows an excess of more than 2°.

The mean temperature of January was 41°·1, or 4°·9 higher than the average of 98 years; higher than the corresponding temperatures in 1867 by 6°·9, and in 1869 by 3°·9, but lower than in 1866, when 42°·6 was recorded.

The mean temperature of February was 45°·3, or 6°·9 higher than the average of 98 years, and, with the exception of 1779, higher than the corresponding values in any year from 1771 to 1868.

The mean temperature of March was 37°·5, or 3°·5 lower than the average of 98 years, and 6·5 colder than in 1868.

The fall of rain was 1·1 inch, and 0·7 inch in excess in January and February, but 0·2 inch in defect in March.

The mildness of the weather in January and February rendered important service to the grazier; the grass-lands afforded sufficient nourishment to enable him to carry his live stock over the winter without the difficulty that was anticipated. By the end of February vegetation was remarkably forward, being from three to four weeks in advance of ordinary seasons. In out-door agricultural work little progress was made during these two months, owing to the land, in many places, being too moist for working. During the greater part of March vegetation was nearly stationary: this check, however, was advantageous. By the end of the quarter vegetation was nearly in the same state as at the end of February, except grass-lands,

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE FIRST SIX MONTHS OF THE YEAR 1869.

1869. MONTHS.	Temperature of Air. Mean.	Air. Diff. from average of 98 years.	Air. Diff. from average of 28 years.	Evaporation. Mean.	Evaporation. Diff. from average of 28 years.	Dew Point. Mean.	Dew Point. Diff. from average of 28 years.	Air—Daily Range. Mean.	Air—Daily Range. Diff. from average of 28 years.	Water of the Thames.	Elastic Force of Vapour. Mean.	Elastic Force of Vapour. Diff. from average of 28 years.	Weight of Vapour in a Cubic Foot of Air. Mean.	Weight of Vapour. Diff. from average of 28 years.
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	grs.
January ..	41·1	+4·9	+3·0	39·6	+2·8	37·6	+2·7	9·5	−0·2	40·7	0·225	+0·023	2·6	+0·2
February ..	45·3	+6·9	+6·2	43·1	+5·7	40·6	+5·7	12·1	+0·7	45·1	0·253	+0·048	2·9	+0·5
March ..	37·5	−3·5	−4·1	35·4	−3·9	32·4	−4·0	12·5	−2·1	40·7	0·184	−0·032	2·1	−0·4
Mean ..	41·3	+2·8	+1·7	39·4	+1·5	36·9	+1·5	11·4	−0·5	42·2	0·221	+0·013	2·5	+0·1
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
April	50·3	+4·3	+3·4	47·5	+3·6	44·6	+4·1	19·8	+1·4	49·9	0·295	+0·042	3·4	+0·5
May	50·5	−2·1	−2·6	48·0	−1·3	45·3	−0·3	17·0	−3·4	53·9	0·303	−0·001	3·4	−0·1
June	55·3	−2·9	−3·9	51·8	−2·9	48·4	−2·4	21·4	+0·4	56·4	0·340	−0·033	3·8	−0·4
Mean ..	52·0	−0·2	−1·0	49·1	−0·2	46·1	+0·5	19·4	−0·5	53·4	0·313	−0·003	3·5	0·0

NOTE.—It must be understood that the sign *plus* (+) signifies that the value in the preceding column was *above* the average; and that *minus* (−) signifies that it was *below* the average.

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE FIRST SIX MONTHS OF THE YEAR 1869.

1869. MONTHS.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Daily Horizontal movement of the Air.	Reading of Thermometer on Grass. Number of Nights it was				
	Mean.	Diff. from average of 28 years.	Mean.	Diff. from average of 28 years.	Mean.	Diff. from average of 28 years.	Amount.	Diff. from average of 54 years.		At or below 30°.	Between 30° and 40°.	Above 40°.	Lowest Reading at Night.	Highest Reading at Night.
			in.	in.	grs.	grs.	in.	in.	Miles.				°	°
January ..	88	0	29·861	+0·115	553	− 1	2·9	+1·1	284	9	18	4	20·2	42·7
February ..	84	− 1	29·807	+0·008	547	− 6	2·3	+0·7	415	6	13	9	27·1	44·1
March ..	83	+ 1	29·632	−0·114	553	+ 3	1·4	−0·2	340	18	13	0	20·4	34·6
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	85	0	29·767	+0·003	551	− 1	6·6	+1·6	346	33	44	13	20·2	44·1
			in.	in.	grs.	grs.	in.	in.	Miles				°	°
April	81	+ 2	29·829	+0·065	542	− 1	1·0	−0·7	271	5	14	11	24·2	52·5
May	83	+ 7	29·651	−0·126	538	− 4	3·4	+1·2	249	3	11	17	26·4	50·0
June	78	+ 4	29·919	+0·112	538	+ 7	1·1	−0·9	219	1	10	19	25·7	53·5
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	81	+ 4	29·800	+0·017	539	+ 1	5·5	−0·4	246	9	35	47	24·2	53·5

NOTE.—It must be understood that the sign *plus* (+) signifies that the value in the preceding column was *above* the average; and that *minus* (−) signifies that it was *below* the average.

pastures, and meadows, which in many places had lost the rich green, and put on a brown dingy colour. Agricultural spring operations were generally in a backward state, and a great deal of ploughing and sowing remained to be done.

The mean temperature of the air in the three months ending February was 44°·1, being 6°·2 higher than the average of the preceding 98 years.

From observations collected from about 50 meteorological stations, it appears that the highest temperatures of the air were at Truro, 64°·0; Osborne, 63°·2; Barnstaple, 62°·0; Liverpool, 61°·7; Royal Observatory, 61°·6; Over Court, 61°·3; and Taunton, 61°·2. The lowest temperatures of the air were at Ripon, 9°·5; Halifax, 17°·0; Strathfield Turgiss, 18°·3; and Cardington and Lampeter, 22°·0. The greatest daily ranges were at Wilton, 16°·6; Osborne, 15°·1; Nottingham, 14°·3; Streatley Vicarage, 13°·0; Leeds, 12°·8; and Aldershot Camp, 12°·4. The least daily ranges were at Hawarden, 7°·3; Guernsey, 7°·4; Otley, 7°·9; Grantham, 8°·5; Worthing, 8°·8; and Bournemouth, 8°·9. The greatest number of rainy days were at Stonyhurst, 72; Little Wratting, 63; Boston, 60; Helston and Hawarden, 58; and Truro, 56. The least number of rainy days were at Wisbech, 34; Strathfield Turgiss and Norwich, 36; Cardington, 38; Otley, 40; Ripon, 41; and Osborne, 42. The heaviest falls of rain were at Lampeter, 14·5 in.; Stonyhurst, 13·9 in.; Truro, 13·2 in.; Cockermouth, 12·8 in.; West Harptree, 12·4 in.; and Weybridge Heath, 11·8 in. The least falls of rain were at North Shields, 4·9 in.; Cardington, 5·6 in.; Liverpool, 5·7 in.; Bradford, 6·0 in.; Wisbech, 6·2 in.; and Leeds, 6·4 in.

Spring Quarter (*April*, *May*, *June*).—At Greenwich the cold period, which set in on the 2nd March, following the remarkably warm months of January and February, continued until the 5th of April. On the 6th there was a change, and the only warm period of any duration during the quarter set in, and extended to the 29th. The mean daily excess of temperature for these 24 days was 5°¼. From the 30th of April to the 12th of May, there were alternations of cold and warm weather; but the cold predominated, and an average defect of temperature was registered of nearly six-tenths of a degree daily. On the 13th of May the weather turned colder, and so continued, with trifling exceptions, until the 1st of June, the cold being most intense towards the end of May, when deficiencies of daily temperature were experienced amounting to 11° and 12°. From May 13th to June 1st the mean temperature was 3°·9 in defect daily. This deficiency occurred principally during the day, the mean temperature being then about 6° to 7° too low, while the night

temperature was about the average value. The period from the 2nd to the 8th of June—with the exception of the 4th day—was warm; on the 7th it was excessively warm, for, throughout the whole twenty-four hours, the excess of temperature was as much as 15°; but on the 10th of June a remarkable period of severe cold weather set in which lasted to the end of the month, some days being marked by exceedingly low temperatures. The average temperature of the month of April was 4°·3 in excess; only four instances of warmer Aprils are recorded, viz., in 1779, 1821, 1844, and 1865. The average temperature of the cold months of May and June was 52°·9, or 7° less than that of the same period in 1868. From 1770 to the present time there were only ten instances of lower temperature in these two months. These instances were in the years 1773, 1792, 1795, 1799, 1805, 1812, 1814, 1816, 1821, and 1824. In the year 1855 the mean temperature of May and June was the same as in this year.

The mean temperature of April was 50°·3, being 4°·3 higher than the average of 98 years; higher than the corresponding temperatures in 1866, 1867, and 1868, when 47°·9, 49°·0, and 48°·1, respectively, were recorded; but lower than in 1865 by 2°·0.

The mean temperature of May was 50°·5, or 2°·1 lower than the average of 98 years, and lower than the corresponding values in 1868 by 6°·8, but higher than in 1866, when 50°·1 was recorded.

The mean temperature of June was 55°·3, or 2°·9 lower than the average of 98 years, and lower than any corresponding value since 1824, with the sole exceptions of 1830 and 1860, in the first of which years the same value was registered, and in the second 54°·8. The mean temperature of June in the year 1868 was 62°·0, or 6°·7 higher than in 1869.

The wintry character of the month of March, with a temperature of 37°·5, checked the progress of vegetation, but the genial weather of April caused vegetation to progress very rapidly, so that by the end of the month the prospects of the harvest were very good. The cold period of May and June was most unfavourable, and by the end of the quarter all cereal crops were backward, and great uncertainty prevailed as to the yield.

Only the early kinds of corn were in ear, and blossomed by the end of June; but this was confined to the Southern counties, so there was every probability that the harvest would be late. The mean temperature of the entire quarter was 52°·0, or 0°·2 below the average. The mean temperature of the air in the three months ending May was 46°·1, or 0°·4 lower than the average of 98 years. The rainfall of the three months was 5·5 inches, 3·4 inches of

which fell in May. The amount of rain was 0·4 inch below the average.

Wheat was in ear on the 3rd June at Strathfield Turgiss; on the 5th at Cardington; on the 6th at Taunton; on the 8th at Somerleyton; on the 9th at Helston; on the 14th at Holkham; on the 16th at Over Court; on the 17th at Llandudno; on the 19th at Hawarden; on the 20th at Grantham; on the 21st at Weybridge; on the 23rd at Hull; on the 27th at Cockermouth; and on the 30th at Hawsker.

Wheat was in flower on the 14th of June at Marlborough; on the 15th at Helston; on the 21st at Eastbourne; on the 24th at Cardington; on the 26th at Holkham; on the 28th at Strathfield Turgiss and Hawarden; on the 29th at Weybridge; and on the 30th at Cockermouth.

Barley was in ear on the 6th of June at Taunton; on the 9th at Strathfield Turgiss; on the 14th at Cardington; on the 23rd at Cockermouth; on the 24th at Weybridge; and on the 25th at Helston.

Barley was in flower on the 8th of June at Marlborough; on the 17th at Strathfield Turgiss; and on the 26th at Cardington.

In April there was a promise of abundant autumnal fruit. In May damage was done to early potatoes, and to the fruit-trees; at Hull swallows died in considerable numbers, perhaps owing to the scarcity of insects, occasioned by cold weather.

In the Quarter ending 30*th June*, the highest temperatures of the air were at Weybridge Heath, 90°·3; Cardington, 90°·0; Camden Town, 89°·3; West Harptree Vicarage, 88°·6; and Taunton, Royal Observatory, and Boston, 87°·5. The lowest temperatures of the air were at Little Wratting and Lampeter, 26°·0; Battersea and Allenheads, 27°·0; Osborne, 27°·2; and Wilton, 27°·5. The greatest daily ranges were at Wilton, 23°·4; Taunton, 22°·2; Nottingham, 21°·1; Weybridge Heath and Royston, 20°·7; and West Harptree, 20°·5. The least daily ranges were at Guernsey, 11°·1; Otley, 11°·6; Hawarden, 12°·7; Liverpool, 13°·1; Sidmouth, 13°·3; and Bournemouth, 13°·6. The greatest number of rainy days were at Stonyhurst, 56; Allenheads, 53; Little Wratting, 49; Boston, 45; and Oxford, Grantham, and Eccles, 44. The least number of rainy days were at Battersea and Halifax, 26; Norwich and Otley, 27; and Strathfield Turgiss and Bradford, 30. The heaviest falls of rain were at West Harptree, 9·5 in.; Allenheads, 8·8 in.; Halifax, 8·4 in.; Hawarden, 8·3 in.; and Osborne, Grantham, and Stonyhurst, 8·2 in. The least falls of rain were at Somerleyton, 4·4 in.; Battersea, 4·9 in.; Carlisle, 5·1 in.; Miltown, 5·2 in.; Holkham, 5·4 in.; and Eastbourne and Royal Observatory, 5·5 in.

CORN: Importations, Sales, and Prices.

Quantities of Wheat, Wheatmeal and Flour, Barley, Oats, Peas and Beans, Imported into the United Kingdom in each of the First Six Months of the Year 1869.

1869.	Wheat.	Wheatmeal and Flour.	Barley.	Oats.	Peas.	Beans.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
January ..	2,614,142	401,528	1,168,069	502,283	125,321	231,198
February ..	2,191,495	379,207	1,504,430	276,099	49,917	242,809
March ..	2,230,378	363,547	986,098	495,899	32,269	203,373
April ..	1,998,612	333,898	521,313	426,176	86,816	132,433
May ..	1,417,090	179,833	297,567	284,451	23,906	81,612
June ..	1,742,304	159,567	209,417	383,191	54,004	69,641
Total in Six Months	12,194,021	1,817,580	4,686,894	2,368,099	372,233	961,066

Note.—The average weights *per quarter* of corn, as adopted in the office of the Inspector-General of Imports and Exports, are as follows:—For wheat, 485⅓ lbs., or 4⅓ cwts.; for barley, 400 lbs., or 34/7 cwts.; for oats, 308 lbs., or 2¾ cwts. Corn has been entered and charged with duty by *weight* instead of *measure* since September, 1864.

Computed Real Value of Corn Imported into the United Kingdom in the Three Years, 1866-7-8.

	1866.	1867.	1868.
	£.	£.	£.
Wheat	12,983,090	24,985,096	22,069,353
Barley	3,745,944	2,832,515	3,799,527
Oats	3,632,385	4,319,908	3,875,929
Maize	4,530,503	3,834,734	4,838,012
Other kinds	1,321,069	1,778,954	1,981,553
Wheat Flour	3,796,911	3,519,577	2,832,077
Other kinds of Flour	36,082	93,350	23,839
Total of Corn	30,045,984	41,364,134	39,420,290

QUANTITIES of BRITISH WHEAT SOLD in the Towns from which Returns are received under the Act of the 27th and 28th VICTORIA, cap. 87, and their AVERAGE PRICES, in each of the First SIX MONTHS of the Years 1864-69.

	Quantities in Quarters.					
	1864.	1865.	1866.	1867.	1868.	1869.
	quarters.	quarters.	quarters.	quarters.	quarters.	quarters.
First month ..	344,930	300,816	212,713	221,791	193,077	248,047
Second month	306,713	298,271	259,999	203,900	201,325	258,883
Third month (five weeks)	350,974	373,069	331,295	280,878	235,402	278,086
Fourth month	285,286	261,501	250,159	205,231	173,120	204,519
Fifth month ..	284,601	327,694	250,890	221,067	162,030	238,483
Sixth month (five weeks)	333,201	283,528	245,393	196,985	128,142	268,599

	Average Prices per Quarter.											
	1864.		1865.		1866.		1867.		1868.		1869.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
First month ..	40	7	38	6	45	10	61	5	70	4	51	10
Second month	40	8	38	3	45	7	60	11	72	11	50	10
Third month (five weeks)	40	1	38	6	45	4	59	9	73	1	48	5
Fourth month	40	0	39	8	44	10	61	7	73	4	46	4
Fifth month ..	39	2	41	0	46	3	64	8	74	3	44	8
Sixth month (five weeks)	39	8	41	5	48	3	65	5	68	9	45	10

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS per Quarter (Imperial Measure) as received from the INSPECTORS and OFFICERS of EXCISE according to the Act of 27th and 28th VICTORIA, cap. 87, in each of the First TWENTY-SIX WEEKS of the Year 1869.

Week ending	Wheat.		Barley.		Oats.		Week ending	Wheat.		Barley.		Oats.	
	s.	d.	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
January 2 ..	50	11	47	2	26	9	April 3 ..	46	4	44	1	26	9
January 9 ..	51	5	48	1	26	4	April 10 ..	47	0	44	6	26	5
January 16 ..	52	8	49	0	25	9	April 17 ..	46	8	44	6	27	7
January 23 ..	52	4	49	7	26	4	April 24 ..	45	5	43	6	26	9
January 30 ..	51	5	48	10	27	6	May 1 ..	44	9	42	2	26	11
February 6 ..	51	0	47	10	27	5	May 8 ..	44	4	40	2	26	9
February 13	50	9	47	9	28	1	May 15 ..	44	6	40	1	26	11
February 20	50	3	47	0	27	4	May 22 ..	45	2	37	7	27	1
February 27	49	7	46	2	28	6	May 29 ..	45	2	37	3	27	0
March 6 ..	49	4	46	0	28	2	June 5 ..	45	5	37	5	26	2
March 13 ..	48	10	45	6	27	10	June 12 ..	46	0	37	1	26	6
March 20 ..	47	9	45	0	27	3	June 19 ..	46	2	32	2	27	8
March 27 ..	46	5	43	8	27	1	June 26 ..	46	4	32	7	29	0
Average of Winter Quarter	50	2	47	0	27	3	Average of Spring Quarter	45	7	39	5	27	0

QUANTITIES of WHEAT, BARLEY, OATS, PEAS, BEANS, INDIAN CORN or MAIZE, WHEATMEAL and FLOUR, IMPORTED in the SIX MONTHS ending 30th JUNE in the THREE YEARS 1867-8-9; also the COUNTRIES from which the WHEAT and WHEATMEAL were obtained.

	1867.	1868.	1869.
Wheat from—	cwts.	cwts.	cwts.
Russia	5,147,296	4,489,880	3,316,375
Denmark	305,412	249,385	201,479
Prussia	3,532,054	2,213,473	2,104,509
Schleswig, Holstein, and Lauenburg	83,599	32,270	27,609
Mecklenburg	498,343	371,446	323,492
Hanse Towns	432,281	382,837	301,679
France	418,793	12,984	155,200
Illyria, Croatia, and Dalmatia ..	239,976	711,169	496,494
Turkey and Wallachia and Moldavia	1,338,159	1,915,656	768,763
Egypt	48,505	2,294,011	353,107
United States	1,071,512	3,817,082	3,657,308
Chili	857,047	476,159	193,385
British North America	87	154,376	105,227
Other countries	475,492	575,775	189,394
Total Wheat	14,448,556	17,696,503	12,194,021
Barley	3,336,476	2,586,529	4,686,894
Oats	4,281,150	3,486,392	2,368,099
Peas	743,118	396,801	372,233
Beans	996,006	1,097,691	961,066
Indian Corn, or Maize	4,563,553	4,913,715	6,618,574
Wheatmeal and Flour from—			
Hanse Towns	238,053	281,407	268,351
France	882,613	227,498	692,271
United States	106,272	338,092	340,478
British North America	6,584	64,126	37,519
Other countries	589,550	515,899	478,961
Total Wheatmeal and Flour	1,823,072	1,427,022	1,817,580

The Average Prices of Consols, of Wheat, of Meat, and of Potatoes; also the Average Number of Paupers relieved on the *last day* of each Week; and the Mean Temperature, in each of the Fourteen Quarters ending June 30th, 1869.

Quarters ending	Average Prices.					Pauperism.		Mean Temperature.
	Consols (for Money)	Wheat per Quarter in England and Wales.	Meat per lb. at Leadenhall and Newgate Markets (by the Carcase).		Best Potatoes per Ton at Waterside Market, Southwark.	Quarterly Average of the Number of Paupers relieved on the *last day* of each week.		
			Beef.	Mutton.		In-door.	Out-door.	
1866	£.	s. d.						°
Mar. 31	87	45 6	4½d.—6¾d. Mean 5⅝d.	5½d—7¾d. Mean 6⅝d.	55s.—90s. Mean 72s. 6d.	139,546	759,402	41·2
June 30	86$\frac{4}{8}$	46 6	4¾d.—7d. Mean 5⅞d.	5½d.—8½d. Mean 7d.	60s.—95s. Mean 77s. 6d.	123,657	734,139	53·0
Sept. 30	88⅜	51 0	5¼d.—7¼d. Mean 6⅛d.	5½d.—8¼d. Mean 6¾d.	75s.—120s. Mean 97s. 6d.	120,955	717,553	58·9
Dec. 31	89$\frac{4}{8}$	56 8	4¾d.—7d. Mean 5⅞d.	5¼d.—7½d. Mean 6⅜d.	85s.—130s. Mean 107s. 6d.	133,979	734,312	46·2
1867 Mar. 31	90⅞	60 7	4¾d.—7d. Mean 5⅞d.	5d.—7¼d. Mean 6⅛d.	115s.—160s. Mean 137s. 6d.	147,620	832,364	38·9
June 30	92$\frac{4}{8}$	64 0	4¾d.—6¾d. Mean 5¾d.	5¼d.—7¼d. Mean 6¼d.	135s.—175s. Mean 155s.	134,678	779,629	53·5
Sept. 30	94$\frac{4}{8}$	65 4	4¾d.—6¾d. Mean 5¾d.	5d.—7d. Mean 6d.	100s.—155s. Mean 127s. 6d.	129,838	743,977	59·7
Dec. 31	94⅜	67 11	4½d.—6¾d. Mean 5⅝d.	4½d.—6½d. Mean 5½d.	110s.—155s. Mean 132s. 6d.	146,237	771,230	42·5
1868 Mar. 31	93	72 2	4¼d.—6½d. Mean 5⅜d.	4¼d.—6½d. Mean 5⅜d.	125s.—170s. Mean 147s. 6d.	159,716	860,165	41·4
June 30	94⅜	71 10	4½d.—6¾d. Mean 5⅝d.	4¾d.—7d. Mean 5⅞d.	130s.—170s. Mean 150s.	142,588	800,944	55·8
Sept. 30	94$\frac{2}{8}$	59 1	4½d.—6¾d. Mean 5⅝d.	4¾d.—6¾d. Mean 5¾d.	120s.—175s. Mean 147s. 6d.	138,284	778,804	63·9
Dec. 31	94⅜	51 11	4½d.—7d.* Mean 5¾d.	4½d.—6¾d.* Mean 5⅝d.	70s.—140s. Mean 105s.	152,733	797,546	45·2
1869 Mar. 31	92⅞	50 2	4¾d.—7¼d. Mean 6d.	4¾d.—7½d. Mean 6⅛d.	70s.—140s. Mean 105s.	162,308	850,883	41·3
June 30	93⅛	45 7	4¾d.—7½d. Mean 6⅛d.	5d.—7¾d. Mean 6⅜d.	60s.—130s. Mean 95s.	151,404†	835,023†	52·0

* From December, 1868, the average prices of meat are derived from the quotations at the Smithfield Meat Market.

† These figures represent the average number of paupers relieved on the last day of each week in April, the pauperism returns not being complete for the subsequent months of the quarter.

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER, in each of the SIXTEEN YEARS 1853-68.

Year.	Wheat.		Barley.		Oats.		Year.	Wheat.		Barley.		Oats.	
	s.	d.	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
1853	53	3	33	2	21	0	1861	55	4	36	1	23	9
1854	72	5	36	0	27	11	1862	55	5	35	1	22	7
1855	74	8	34	9	27	5	1863	44	9	33	11	21	2
1856	69	2	41	1	25	2	1864	40	2	29	11	20	1
1857	56	4	42	1	25	0	1865	41	10	29	9	21	10
1858	44	2	34	8	24	6	1866	49	11	37	5	24	7
1859	43	9	33	6	23	2	1867	64	6	40	0	26	1
1860	53	3	36	7	24	5	1868	63	9	43	0	28	1

CERTAIN ARTICLES of FOREIGN and COLONIAL PRODUCTION IMPORTED in the THREE YEARS 1866-68; and their QUANTITIES.

		1866.	1867.	1868.
ANIMALS, Living:				
Oxen, Bulls, and Cows	number	209,171	156,335	114,869
Calves	,,	28,568	21,613	21,819
Sheep	,,	777,174	532,316	323,447
Lambs	,,	13,706	7,400	17,708
Swine and Hogs	,,	73,873	48,079	33,721
Sheep and Lambs' Wool	lbs.	235,741,101	230,224,467	249,931,714
Bones (burnt or not, or as animal charcoal)	tons.	80,316	83,814	75,850
Cotton, Raw	cwts.	12,295,803	11,272,651	11,857,893
Flax	,,	1,547,598	1,440,669	1,816,669
Guano:—From Peru	tons.	109,142	164,112	150,774
Other parts	,,	26,555	28,196	26,577
Total Guano	,,	135,697	192,308	177,351
Hemp	cwts.	1,001,098	878,374	1,072,669
Hops	,,	85,687	296,117	231,720
Hides untanned: Dry	,,	270,644	280,063	305,318
,, ,, Wet	,,	785,999	615,822	635,794
Petroleum	tuns.	30,866	22,494	17,161
Oilseed Cakes	tons.	129,023	121,832	160,281
Potatoes	cwts.	738,193	1,374,223	2,041,474
Butter	,,	1,165,081	1,142,262	1,097,539
Cheese	,,	872,342	905,476	873,377
Eggs	number	438,878,880	397,934,520	383,969,040
Lard	cwts.	228,459	246,839	237,260
Bacon and Hams	,,	635,782	537,114	638,127
Salt Beef	,,	178,362	195,797	240,577
Salt Pork	,,	178,548	142,831	144,378
Clover Seeds	,,	226,014	150,968	264,878
Flax-seed and Linseed	qrs.	1,158,736	1,095,360	1,625,518
Rape	,,	474,667	620,782	354,487

ACREAGE under each Description of Crop, Fallow, and
Great Britain and

Description of Crops and Live Stock.	Great Britain.		
	1866.	1867.	1868.
Corn Crops:—	Acres.	Acres.	Acres.
Wheat	3,350,394	3,367,876	3,652,125
Barley or Bere	2,237,329	2,259,164	2,151,324
Oats	2,759,923	2,750,487	2,757,053
Rye	60,077	52,865	46,896
Beans	524,657	536,298	529,900
Peas	320,404	318,090	296,234
Total Corn Crops	9,252,784	9,284,780	9,433,532
Green Crops:—			
Potatoes	498,843	492,217	541,543
Turnips and Swedes	2,152,042	2,173,850	2,165,142
Mangold	258,797	258,126	249,041
Carrots	16,809	15,923	13,265
Cabbage, kohl-rabi, and rape	165,943	133,692	115,083
Vetches, Lucerne, and any other crop (except clover or grass)	470,000	424,355	301,792
Total Green Crops	3,562,434	3,498,163	3,385,866
Other Crops, Grass, &c.:—			
Flax	* ..	* ..	17,543
Hops	56,578	64,284	64,488
Bare fallow or uncropped arable land	964,937	922,558	958,221
Clover and artificial and other grasses under rotation	3,694,224	3,989,974	3,960,008
Permanent pasture, meadow, or grass not broken up in rotation (exclusive of heath or mountain land)	11,148,814	11,967,288	12,136,036
Live Stock:—	No.	No.	No.
Cattle	4,785,836	4,993,034	5,423,981
Sheep	22,048,281	28,919,101	30,711,396
Pigs	2,477,619	2,966,979	2,308,539

* In these years Flax was returned in Great

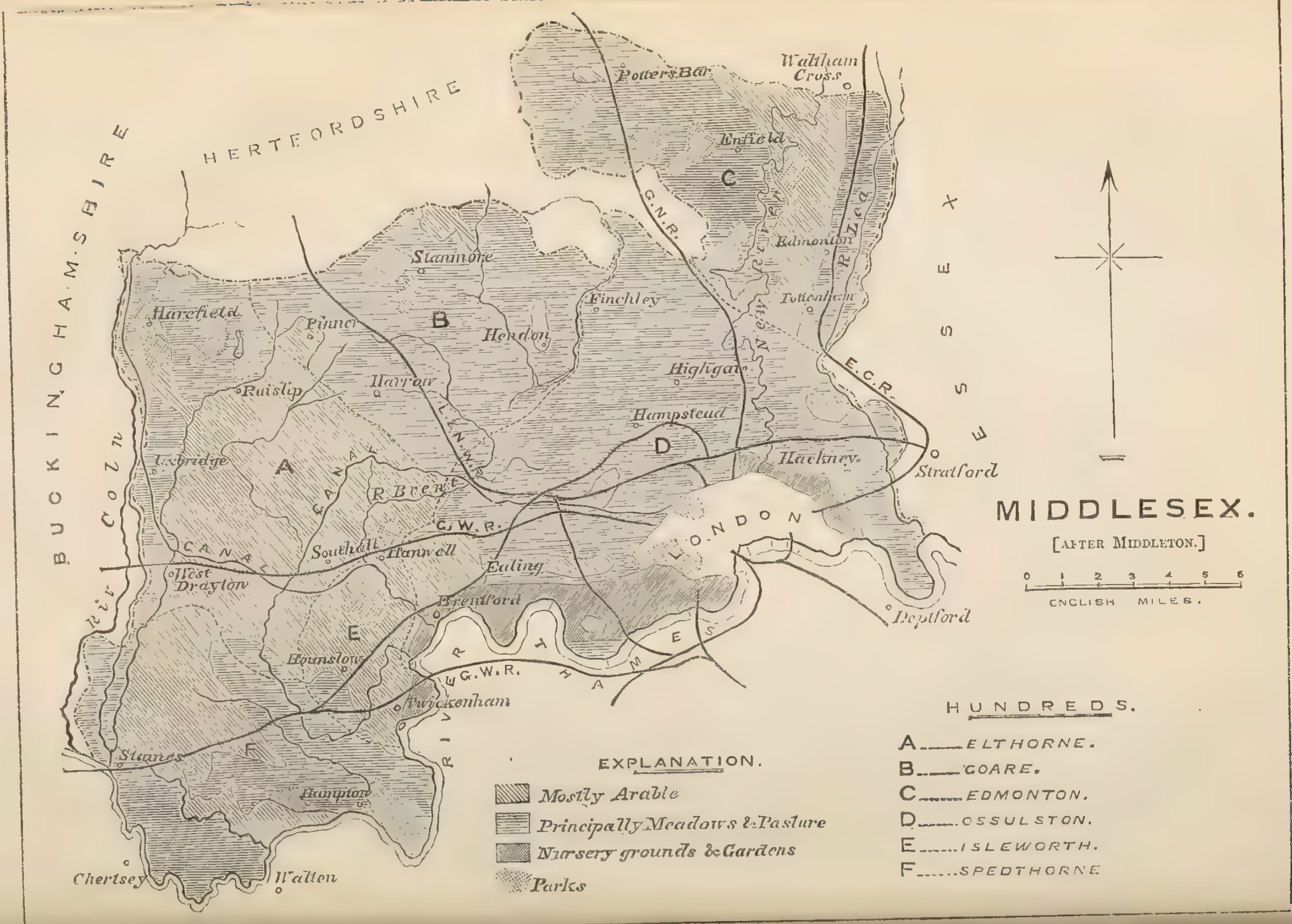
GRASS, and NUMBER of CATTLE, SHEEP, and PIGS, in IRELAND in 1866–7–8.

Ireland.			United Kingdom, including the Islands.		
1866.	1867.	1868.	1866.	1867.	1868.
Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
299,190	261,034	285,150	3,661,351	3,640,051	3,949,378
152,520	172,932	188,332	2,398,228	2,440,242	2,348,148
1,699,695	1,660,511	1,701,645	4,471,344	4,423,097	4,471,113
7,794	7,671	7,892	67,920	60,616	54,865
12,204	11,180	8,813	537,239	547,782	538,943
2,630	2,372	1,147	323,184	320,715	297,602
2,174,033	2,115,700	2,192,979	11,459,266	11,432,503	11,660,049
1,050,353	1,001,781	1,034,681	1,555,543	1,500,860	1,584,041
317,198	335,728	320,094	2,478,545	2,519,437	2,495,564
20,082	18,739	19,031	279,851	277,886	268,744
3,798	3,397	3,789	22,078	20,687	17,815
49,949	35,453	42,268	216,207	169,473	157,525
40,145	37,254	36,264	512,134	463,553	341,188
1,481,525	1,432,352	1,456,127	5,064,358	4,951,896	4,864,877
263,507	253,257	206,483	* ..	* ..	224,034
..	..	..	56,578	64,284	64,488
25,419	26,191	24,017	1,001,637	953,998	984,246
1,601,423	1,658,451	1,691,797	5,325,047	5,679,433	5,690,318
10,004,244	10,057,072	10,003,918	21,174,787	22,052,510	22,164,584
No.	No.	No.	No.	No.	No.
3,746,157	3,702,378	3,620,352	8,569,693	8,731,473	9,083,416
4,274,282	4,826,015	4,822,444	26,380,248	33,817,951	35,607,812
1,497,274	1,233,893	862,443	3,997,780	4,221,100	3,189,167

Britain with the unenumerated Green Crops.

Pauperism.

The return of the number of paupers in England and Wales at the beginning of the year shows that on the 1st of January, 1869, the number was 1,046,569, being an increase of 6466 over the number at the corresponding date in 1868. The in-door paupers on the 1st January, 1869, were 168,417; the out-door, 878,152. The number of adult able-bodied paupers relieved was 183,162, a decrease of 2468 on the number on the 1st January, 1868. Receiving in-door relief there were 29,826, receiving out-door relief there were 153,336.


MIDDLESEX.
[AFTER MIDDLETON.]
0 1 2 3 4 5 6
ENGLISH MILES.
HUNDREDS.
A ELTHORNE.
B COARE.
C EDMONTON.
D OSSULSTON.
E ISLEWORTH.
F SPEDTHORNE
EXPLANATION.
Mostly Arable
Principally Meadows & Pasture
Nursery grounds & Gardens
Parks
HERTFORDSHIRE
BUCKINGHAM·SHIRE
ESSEX
LONDON
Potters Bar
Waltham Cross
Enfield
Edmonton
Tottenham
Stanmore
Finchley
Harefield
Pinner
Hendon
Highgate
Ruislip
Harrow
Hampstead
Uxbridge
Hackney
Stratford
Southall
Hanwell
Ealing
West Drayton
Brentford
Deptford
Hounslow
Twickenham
Staines
Hampton
Chertsey
Walton
G.N.R.
E.C.R.
L.&N.W.R.
G.W.R.
CANAL
R. Brent
River Colne
RIVER THAMES

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

I.—*The Farming of Middlesex.* By the Rev. JAMES C. CLUTTERBUCK.

PRIZE ESSAY.

THE geographical limits of the metropolitan county of Middlesex are mostly ruled by physical features. On the south it is bounded by the Thames, on the west by the Coln, and on the east by the Lea. The northern boundary, though imperfectly defined and irregular in direction, to a certain extent follows the undulations of a low range of hills, and from the Coln to Barnet Gate coincides with the limits of the watershed of the Brent, Yedding, and other brooks and watercourses by which the surface of the county is drained. According to a Return presented to Parliament in 1866, the county contained 180,136 statute acres; its population being 2,206,485, and, in 1867, 2,414,022: the largest, with the exception of Lancashire, of any of the counties of England.

Notwithstanding its vast population and limited extent, the percentage of corn-crops to acreage under all sorts of crops exceeds that of Lancashire by nearly 6 per cent.: that of Lancashire being 15·2, whilst that of Middlesex is 19·1; in 1867, 18·8. Unlike Lancashire, its population is concentrated in one locality, namely, the south-eastern limit of the county, which is occupied by London and its suburbs; with this exception, Middlesex would give a high average of cultivated surface, as compared with many of the counties of England. This is mainly due to its geological condition and the character of the soil. No portion of it is absolutely sterile, though some spots are naturally poor and unproductive.

Geological Features and Character of the Soil.

London gives its name to the geological basin of which it may be said to form the centre. Most of the surface or subsoil of Middlesex consists of the clay known as the London Clay, which rests on the lower tertiary beds or the Plastic Clay formation, whose upper surface is, as its name indicates, a tenacious clay, between which and the underlying chalk are beds of sand varying in thickness and in quality, some highly ferruginous, others of the purest silex, uncharged with any extraneous substance. It is only in a small portion of the north-west corner, and a still smaller portion of the north-eastern corner of the county, that these strata form the surface; the former being the escarpment of the tertiary strata immediately overlying the chalk, here exposed where it overhangs the River Coln, which a little lower down exchanges its bed in the chalk for the overlying London and Plastic Clays, and these it retains until it joins the Thames at Staines. The main river runs on the same bed till it passes the south-eastern outcrop of the chalk, at or about the boundary of the county below London. Though the lower tertiary beds, resting on the chalk, describe the geological condition of the county, there are other features which rule a great portion of its agricultural character and condition, especially that under arable cultivation.

The higher elevations, such as Hampstead, Highgate, Finchley, Harrow, Stanmore, and others, rising on an average 400 feet above the sea, are, on the ridges and crowns of the hills, capped with traces of the lower Bagshot beds or of the higher level gravel, and these, from their porous character, permit the percolation of water, which, being upheld by the subjacent impervious clay, is thrown out in springs, as at Hampstead and Highgate, where it is stored in reservoirs. Indeed, as all the higher levels are capped more or less by these beds, yielding water, here are the small perennial sources of the River Brent, Yedding, and other brooks. Moreover, the presence of water in these gravels has attracted a population, which is remarkably deficient in very many parts of the county, as, for example, the line of the Yedding Brook, between Harrow and Uxbridge, in many square miles where scarcely a habitation is to be found. The lack of other than surface-water is in some places relieved by artesian wells bored through the tertiary clays, and where the level permits, as at Uxbridge and Tottenham, they deliver their supply above the surface. The height to which water will rise from these sources has been calculated, and in general terms will accord with a line drawn from the known source of supply in the outcropping chalk to the north, to its natural outfall in

A GEOLOGICAL MAP OF MIDDLESEX.
Chalk
Plastic Clay
London Clay
Loam & Gravel
Bagshot Sand
Parks
HERTFORDSHIRE
BUCKINGHAMSHIRE
ESSEX
Potters Bar
Waltham Cross
Enfield
Edmonton
Tottenham
R. Lea
New River
G.N.R.
E.C.R.
Stanmore
Finchley
Hendon
Highgate
Hampstead
Hackney
Stratford
Harefield
Pinner
Harrow
Ruislip
Uxbridge
LINE OF SECTION
L.&N.W.R.
R. Brent
CANAL
G.W.R.
Southall
Hanwell
Ealing
West Drayton
Brentford
LONDON
Deptford
Hounslow
S.W.R.
R. THAMES
Twickenham
Staines
Hampton
Chertsey
Walton
R. Colne
RIVER
SECTION FROM THE COLN TO THE THAMES.
R. Coln
N.W.R.
R. Brent
London
R. Thames
LONDON CLAY
PLASTIC CLAY
CHALK
0
5
15
20
A
B

the bed of the Thames below London. Ancient London was in a great measure supplied by wells sunk into the gravel by which the clay is there covered, and it was only as the population increased and the area extended beyond these beds that the supply from extraneous sources was needed.

The whole of the south-western portion of the county, south of a line nearly coincident with the high turnpike-road from Uxbridge to London is of a marked and peculiar character. The substratum is London Clay, covered by a bed of low level subangular flint-gravel, which is again, over a great portion of its surface, covered by a fine sandy loam or brick-earth, apparently of ancient fluviatile or lacustrine deposit; a condition of soil which, though chiefly developed in this part of the county, is also found in a narrow strip to the entire eastern boundary, following the line of the River Lea. Norden, in his 'Speculum Britanniæ'—the oldest record of the state of agriculture in the county—in the first edition, dated 1593, says of Middlesex (derived from "Middle Saxon"):—

"The soyle is excellent, fat and fertile and full of profite, it yieldeth corne and graine, not onelie in aboundance, but most excellent good wheate, especiallie about Heston, which place may be called Granarium tritici regalis for the singularitie of the corne—the vaine of this especialle corne seemeth to extend from Heston to Harrow."

He also says—

"This part of Middlesex may for fertilitie compare with Tandeane (Taunton dean) in the west part of Somersetshire, but that Tandeane farre surpasseth it for sundrie fruites and commodities, which this countrie might also yeelde were it the like employed, but it seemeth they only covet to maintaine their ancient course of life and observe the husbandrie of their fathers without adding any thing to their greater profite."

This last remark is certainly true at the present time with reference to grass and meadow cultivation, if not to other branches of husbandry. John Speed, in his 'Description of Middlesex,' in his 'Theatre of the Empire of Great Britain,' in the reign of James I., says—

"In form it is almost square, for air passing temperate, for soil abundantly fertile, and for pasture and grain of all kinds yielding the best; so that the wheat of this county hath served a long time for the manchet of our Prince's table."

The tradition that Queen Elizabeth would have none other than bread made from wheat grown at Heston is still preserved in the neighbourhood; and to this day the finest qualities of wheat, chiefly Chidham, are grown on the loam or brick-earth of Middlesex; and it is to the wheat grown on this district, which extends into Buckinghamshire, that Uxbridge Market is famed for the superior quality of wheat which finds a sale there.

The normal aspect and condition of the surface of soil, especially at or about Heston, has undergone and is daily undergoing a change by the removal of brick-earth in the manufacture of bricks. Not only is there the temptation to the proprietors of the soil of a royalty on every thousand of bricks, varying from 1*s.* to 2*s.* 6*d.*, but the Grand Junction Canal passes through the middle of this district, and with the aid of rail or tram roads facilitates the carriage of the ware to London and all parts of the country. The Great Western and other railways, though not offering the advantage of water-carriage, assist in robbing the south-western limb of Middlesex of its fertile sandy loam. A part of the bargain with the brickmaker is that the tilth shall be replaced and the surface levelled; yet it is manifest that there must be a deterioration of the land, though the manure conveyed from London as back-carriage by the canal-boats in some measure replaces the natural by the introduction of an artificial fertility. In some spots where the water, which is found in the gravel throughout the district, is reached in the removal of the brick-earth, osiers are planted, and the waste of space prevented. The older records of the state of agriculture in the county are scanty, and generally local till 1793, when 'A General View of the Agriculture of the County of Middlesex' was published by Thomas Baird. This was followed by a larger and more elaborate Report, drawn up for the consideration of the Board of Agriculture by John Middleton in 1813; and it will be necessary to refer to these writers in that which follows, before quitting the question of the geological features and character of the soil, to notice what they say of the commons at the time their reports were written. Though all these commons, with little exception, were on poor and hungry gravel or sandy soil, they are now under cultivation. Baird, speaking of Hounslow Heath and Finchley Common, says, they are wastes fitted only for Cherokees and other savages; and, quoting Rocque's map, 1754, gives Hounslow at 6658 and Finchley at 1243 acres. That part of Stanwell in the former was sold for 21*l.* per acre. He gives Enfield Chase at from 2000 to 3000 acres. Middleton, quoting from the same sources, gives various details as to the time of certain enclosures and their extent, though the latter are only approximations to the truth, and are only interesting as matters of history; and when speaking of the then state of Hounslow Heath, he describes it as land of such good quality that it was disgraceful to the county and insulting to the inhabitants of the metropolis that it should remain in its then unproductive state, when it might be brought to yield an average produce of 10*l.* per acre. This remark may be taken as a forecast of a coming reality, such as may be found in many pages of this

sagacious and painstaking author's work. The writer of this Essay was told by a farmer who was detailing his method of forcing two crops on a fallow on a portion of that which had been Hounslow Heath, "It will not do to be content with crops which only return 10*l.* per acre," as though that, being the amount fixed on by Middleton, would be the amount under ordinary cultivation.

Grass or Meadow Land.

In few counties is the meadow and arable land so nearly divided, or the extent so clearly defined, and though not without exceptions, the surface occupied by the London clay, and the loam or brick-earth respectively, determines the extent under grass and under the plough. According to the Parliamentary return before mentioned the extent occupied by pasture and meadow is 71,143, and in 1867 72,068 acres, leaving for other crops 38,736, and in 1867 36,832, or about two-thirds in meadow. In a note it is stated that "these returns have been collected from occupiers of and above five acres of land." In a country where there are so many small residences, with small plots of accommodation land attached, this will add to the acreage a considerable breadth of surface. Middleton gives 70,000 acres of upland, 2500 as low meadow, and 500 for the Isle of Dogs then under grass. The suburbs of London have encroached on this quantity, which has been replaced by laying down in grass much of the heavy land formerly under bean and wheat cultivation, when his rough and unverified estimate was made, whereas the land under corn and root crops has been extended by the cultivation of commons, given by him at 8688 acres.

The cultivation, or rather treatment, of grass land is the characteristic feature of Middlesex farming, the great object being to supply the London market with hay, and maintain the productive power of the soil by the application of London dung; a system not confined to farms properly so called, but comprehending the parks and paddocks which occupy a considerable portion of the surface of the county. Notwithstanding, however, the proximity to London, the soil offers but little attraction for the residences of gentry—who do not accept the description given by Speed, who says of Middlesex,—

> "It lieth seated in a vale most wholesome and rich, having some hills also, and them of good ascent, from whose tops the prospect of the whole is seen like unto Zoar in Egypt, or rather like a Paradise and Garden of God."

Though many farms on the clay are not exclusively grass land, the extent of arable is not sufficient in most cases to affect the character of the farming, which is very simple, and as

compared with arable cultivation requires little capital, few and simple farm buildings, and no great amount of agricultural skill. The great object is to secure the first hay crop in such a condition that it may retain its weight, be set off by the best colour and "bouquet," and so command the best price in the London market. The other operations of the farm have reference, and are made subservient to this main object. Very many of the fields are laid out in small, and not very convenient enclosures; sometimes overgrown with timber in the hedgerows, which are generally of white or black thorn, in some places ragged and ill-cared for, and usually laid after a certain number of years' growth. The elm timber is often unduly shredded, and the oaks, especially on the sheer London clay, are of stunted growth. As a rule the higher ground, or that on the outcrop of the plastic clay, is best clothed with timber, especially when, as is generally the case, it is here that gentlemens' seats are placed. On some farms the quickset hedges are kept neat and trim. Hay farming, from its very nature, is a precarious and anxious occupation, ruled by, and depending very much on sudden and unlooked for changes of the weather, and requiring the constant and practical application of the old proverb to "make hay while the sun shines."

Many of the farms, and especially those near London, are held by persons engaged in some other business. Hay farming can never occupy the whole time and attention of a person of active and industrious habits.

Where the land is exclusively under grass the number of labourers permanently employed is necessarily few, the horse teams being sometimes the only live stock. The mowing is for the most part performed by hand labour, by strangers who come in companies from the counties of Bucks, Berks, and Oxford, and other places. Mowing by machinery is not so often practised as might be expected: some persons keep a machine, rather "in terrorem," to secure themselves against the difficulty of unreasonable demands, as to price, and wages, in time of pressure, than from preference for this method of cutting the grass crop; some will own that they are unwilling to risk a collision with their regular staff of labourers, who look with an evil eye on that which they consider (however unjustly) an interference with the rights of labour. Mowing is, as in all such cases, undertaken by the acre, the price varying very much with the state of the weather, the supply of labour, the condition of the crop, and such like variable incidents. The haymakers, like the hop-pickers of Kent and Surrey, are often strangers from various quarters seeking casual, and, for a time, fairly paid employment. The Irish element, which at one time bore a

large proportion to the whole casual supply, is now nearly extinguished.

Strangers are sometimes even hired by the hour, so that if the employer be dissatisfied with the work, or if the weather change, they may at once be paid off. Where the farms consist partly of arable and partly of grass land, the regular labourers on the farm, with the addition of casual local assistance, which the agreeable associations of the hay-field seldom fail to call out, are found sufficient to secure the crop. Tedding machines are in very general use. They are now brought to a very high state of perfection, their double action performing two almost distinct operations in the process of haymaking: either shaking from the swathe, after the scythe or machine; or keeping it moving in the air, and thus under some conditions of weather securing the rapid accomplishment of the process, by which the colour and weight are retained, and time and labour economised. In very hot weather the latter use of the machine is sparingly put in requisition, as it endangers the breaking and loss of some parts of the tender portions of the crop.

The introduction of rick-cloths—said to have been invented or first used by Sir Joseph Banks—for the protection of ricks in the course of building, and portable scaffolds with stages to facilitate the pitching of the hay from the carts, is within the memory of man; they are now among the most economical, if rather costly, articles of the hay-farmer's stock. "The larger the rick the better the hay" is almost proverbial in Middlesex, as there is less outside in proportion, and it cuts out more economically.

It requires much practical experience, and much patient discretion, to put together a large mass of hay, from which first all water-wet, namely, that which it receives as rain or dew, must be evaporated to prevent mould and dust; in fact, to strike a balance between the too great desiccation of the hay, and its consequent loss of those succulent properties on which its quality and weight depend; and the carrying too soon, and so risking the overheating and possible firing of the mass, or the vexatious alternative of cutting or turning the rick, a process which, as is well known in Middlesex, calls from the passer-by the jeering enquiry, "Farmer have you lost your watch?"

It is remarked by Baird, and it is indeed universally acknowledged, that more hay is spoiled in fair weather than in foul, obviously from impatience and over-anxiety to secure the crop. Large ricks also require skilful and careful builders, under whose guidance the work on the rick is carried on; peculiar attention being paid to the probable settling of the whole evenly, and in proper form.

When the rick is finished in a rectangular form the sides are

pulled, and the thatching not only performed with care, but with especial regard to the economy of straw, in a district where, if not grown on the farm, it must be bought at a high market price.

Middleton, in an elaborate account of the process of haymaking, says, "By the farmers of Middlesex it has been brought to a degree of perfection unequalled in any other part of the kingdom." He apportions five haymakers to each mower, and describes the operations of every day as beginning with the early morning, tedding all that is cut before 9 o'clock, turning before dinner, raking into single windrows, and putting it into grass cocks. The second day begins with tedding the grass mown after 9 o'clock on the previous day, and that mown on the same morning; the grass cocks are shaken into staddles, or separate plats, five or six yards in diameter with distances between, regulated by the amount of the crop, the spaces between being raked clean; the staddles after being turned, are raked into double windrows—that is, raked together by two persons in opposite directions—then put into bastard cocks, which are afterwards made into full sized cocks. The hay is then carried. A full and minute description is given of the way in which the time of each day is filled up, with the operations on the grass cut in succession. This epitome gives the method adopted on each portion of the crop—care being taken never to have more grass in hand than can be managed on this system, which, subject to the modifications of fair or foul weather, corresponds with that pursued at the present day; the mowing occasionally, and the tedding and turning, being performed by the mowing and tedding machines. Though this system is generally pursued, the success of the operation must depend on the energetic attention and superintendence of the farmer. No precautions to prevent overheating and the like, as described by Middleton at great length, can be more than hints, as compared with the practical skill and experience indispensable to successful management in securing the hay crop in a condition best fitted for the London market.

A second crop of hay is sometimes cut, and bears the local name of "Rowen," but it is necessarily of inferior quality, and is usually consumed by cow stock; under any circumstances it is deemed bad farming thus to task the fertility of the soil, even when heavily manured; it moreover injures the quality of the swathe. The after-grass is hence usually fed by neat cattle or sheep, adding such artificial food as will make them off by the turn of the year, at, or soon after which, the fields should be shut up for the succeeding crop. The cutting out, trussing, making the bands, and placing the hay on the carts, all requires skilful and experienced hands; the work being usually done by a man and a boy.

The trussing is paid for by the load of thirty-six trusses, weighing 56 lbs. each, or at one penny per truss: it is seldom done by the day.

Of late years lighter carts, fitted as is the custom with ladders and copses, have generally superseded those of heavy and unwieldy construction, with broad wheels of large diameter. The load is drawn to the London markets by one, sometimes two horses. Of the three markets, Whitechapel, Smithfield, and Cumberland (St. James now only retaining the name), Cumberland is the best arranged. The Regent's Canal, of which the basin is immediately to the north of the market, brings hay and straw, and conveys away the manure, though this is rather a convenience to the distant growers than to the Middlesex farmer, who, if they have no private contract or agreement for the supply of hay and removal of manure, consign their loads of hay to salesmen (who it is hoped do not at the present day deserve the character given to them by Middleton). The commission per load if immediately delivered is 4*s.*; if this be left to the salesman an additional shilling is added, but this is deemed an insufficient remuneration for the trouble it entails.

The regular traders usually have an extra cart left in hay barns attached to the market, for the care of which 2*s.* per week is charged; when the next load is brought this cart is taken either in search of manure, or to those stables with which a contract has been made for its regular removal. This saves much time, and men and horses return home without unnecessary delay; 2*s.* 6*d.* is the sum usually allowed to carters who go in search of the return load of manure, which is either clumped and allowed to rot, or often immediately spread on the land on its arrival at the farm; but the latter practice is daily increasing in favour. Sometimes the Middlesex farmers sell their ricks to jobbers, or "jockey men," as they are called, sometimes under agreement to return manure, at others without any restriction. When the marketing of the hay and the return of manure are entirely carried on by the farmer, it involves much night work on the road for men and horses, and too often has a bad moral effect on the former from constant temptations to drink, and sometimes, as a consequence, to dispose dishonestly of the fodder of the horses, and occasionally of a portion of the load itself. These evils are so keenly felt by some persons, that they prefer selling their hay in bulk, or grazing their land, to sending their hay to the London market.

Though the greatest part of the grass land of Middlesex is in the northern part of the county, where the surface of the London and Plastic clays is exposed, there is a considerable breadth of low meadow adjoining the western and south-western

boundary, part of it flooded at certain seasons by the waters of the Thames and Coln. To the east there is the same condition on the banks of the Lea, such as Hackney Marsh, and meadow land interspersed with garden cultivation, which is found in that district, is again varied by some part being under ordinary arable cultivation. A fair idea of the relative situations and quantities of arable and meadow may be formed from the map illustrating Middleton's report, of which a copy showing these divisions is given, though the commons must now be reckoned as arable, and a large part of that marked arable between Harrow and Uxbridge as now laid down in grass.

The estimates that Beard gives of the area of the county are so wide of the mark that they are scarcely worth notice, except inasmuch as they show his idea of the relative quantities of meadow, arable, nursery, and common. He gives the whole area at 250,000 acres, of which he estimates 130,000 as meadow, 50,000 arable, 50,000 nursery, and 20,000 common. Middleton comes near the absolute quantity, 280 square miles, or 179,200 acres; of this he gives 73,000 as meadow; upland, 70,000; low meadow, 2500; the Isle of Dogs, 500. He accounts for 20,000 acres in corn crops, but gives no details as to potatoe and other root crops or garden ground. The Parliamentary Returns already quoted for 1866 and 1867 give a detailed account of the quantities, not only as to grass and arable, but each sort of crop grown. The total area, as before stated, is 180,136 acres in extent; the areas under grass and arable being as follows:—

	Under all Crops.	Under Permanent Grass.	Under Arable.	To be accounted for.
1866	109,879	71,143	38,736	70,257
1867	108,900	72,068	36,832	71,236

Allowing that two-thirds of this area to be accounted for, is occupied by buildings, roads, railways, and other encroachments,—amounting as it appears to an increase of 969 acres between the dates of the returns of 1866 and 1867—about 23,416 or 23,742, or with the increase of buildings, 23,000 may remain for plots under 5 acres, market and other gardens not included in the cultivated area. The original gardens and orchards of Kensington, Isleworth, Brentford, and Twickenham, and other places to the north-east of London, on the line of the river Lea, scarcely come within the scope of an essay on agriculture, though they are noticed by Middleton as lining the road for 7 miles in length between Kensington and Twickenham. In the neighbourhood of these places the apple, pear, cherry, and other fruit trees, standing in the small gardens attached to the newly built houses, show by their age and linear position, that they were originally planted as orchard trees. These orchards, with their upper and

under crops, are disappearing more rapidly than they can be replaced on newly planted ground. The sale of the produce, whether orchard or kitchen, and the maintenance of the fertility of the soil, manifestly depend on their vicinity to London. As with the hay, so with the garden crops; each load sent to market is replaced by a return load of manure, a system absolutely necessary to suburban garden cultivation, and daily extending to farms under the plough, by the introduction of the market-garden element in the cultivation of green and root crops to be consumed in London.

Arable Land.

There were in 1866 38,736, and in 1867 36,832, acres of land to which the term arable may be applied. A few examples of extensive and well cultivated farms will be sufficient to show their system and general character, as well as the influence of the London markets on their management; while a comparison of the crops grown on the arable land as roughly estimated by Middleton, with those given in detail in the Parliamentary Returns for 1866 and 1867, will indicate the character of the farming, and by showing the relative quantity of each crop grown, to a certain extent, indicate the variation of system, and the purpose to which the produce was put, at that time as compared with the present. In giving the quantities of green crops then grown, Middleton advises, as a manifest improvement, the increased production of various green crops, on the then usually adopted naked fallow; and he even, suggests a possibility of that which of late years is so much practised, of two green crops, and even three, being grown in one season on otherwise unproductive soil. The quantities as given by Middleton and the Parliamentary Returns are as follows:—

Middleton.

Wheat.	Barley.	Oats.	Rye.	Beans.	Peas.	Total.
10,000	4000	A few.	A small quantity.	3000	3000	20,000

Parliamentary Return.

	Wheat.	Barley.	Oats.	Rye.	Beans.	Peas.	Total.
1866	9654	2222	5745	440	1466	1469	20,996
1867	9518	2191	5527	565	1321	1373	20,495
Diff.	136	31	218	In. 125	145	96	501

The only increase as between 1866 and 1867 is on the rye crop, used as green fodder for horses and cows, or fed by sheep.

Middleton does not give the area cropped with either potatoes or turnips, though both were extensively grown; he says that

swedes were not then cultivated, and mangold was unknown as a crop.

Of green and root crops the Parliamentary Return gives the following account:—

	Potatoes.	Turnips and Swedes.	Mangold.	Carrots.	Cabbage, Kohl Rabi, and Rape.	Vetches, Lucerne; other Green Crops.	Total.
1866	2737	2302	1437	79	719	3930	11,204
1867	1882	2216	1698	36	871	2879	9,582
						Decrease	1,622

	Bare Fallow.	Hops.	Clover and Artificial Grasses.	Permanent, Pasture, and Meadow.
1866	1314	4	5182	71,143
1867	1031	..	5734	72,068
			Increase	925

The difference in the two years is a decrease in the arable, and an increase of grass cultivation, with a decrease of area cultivated on the whole; a like decrease being only to be found in the counties of Durham and Surrey. The double cropping of fallows is not noticed. There is, however, an increase in clover and artificial grasses.

Arable Farms.

There are many large occupations on which the ordinary arable treatment is modified by the application of a market garden element to some part of the produce; in others, this element is scarcely to be traced.

Take as an instance of the first of these, a farm within 7 miles of Charing Cross, nearly equally divided between the London Clay and the loam and gravel; consequently half grass-land and half arable. The grass-land is farmed on the system common in the county, and before described as hay-farming. Ten neat cattle and no sheep are kept, therefore a great proportion of the hay is sent to London, usually under contract or agreement for manure as back carriage. The short distance to London enables the teams to make two journeys, and return two loads of dung to one of produce. The same arrangement is made as to a part of the straw from the arable land, which is also sent to the London market.

The arable portion of the farm is on the gravel not here covered with a great depth of the loam or brick earth, yet fertile and well fitted for corn and green crop cultivation. The rotation of crops is of a most elastic character. As the quality of wheat and its straw is valuable, it is grown as often as may be in preponderance to other white corn crops. Tares, rye,

winter barley, and clover, are sold green to those who fetch them, and return manure in their place. Potatoes, mangold, and white turnips are the chief root crops, and are drawn from the farm by the purchasers, in London and its suburbs, supplying food for man and beast; this being the great guiding principle in the management of this suburban farm. The rent is necessarily high. The anxiety of tending stock (or may be, its pleasure) is dispensed with, a great part of the produce is sold on the ground and removed by others, yet the arrangement of the course of cropping requires intelligence and skill, to make the most of the facilities and advantages of the power of production, by an unlimited command of manure from London.

Double the distance from Charing Cross, from 7 to 14 miles, and the distance from the market reverses the whole system. The farm over 600 acres is with slight exception arable; part, where the loam is deeper; part, where it scarcely covers the surface of the gravel, corresponding in quality with the least fertile parts of Hounslow Heath. The occupier of this farm being a person of enterprise and energy, the latest improvements in machinery and other appliances are introduced. There are well-arranged farm buildings, feeding-sheds, piggeries (with a preference for pig stock as converters of part of the produce in straw, corn, and roots into manure), a stationary steam-engine, with mill and threshing gear, and other appliances attached, together with steaming apparatus for the preparation of roots for stock. As few neat cattle are kept, the bulk of the root and green crop produce is consumed by a dry flock of over 600 sheep. Thus with the exception of a part of the straw which is sold to jobbers, with return of manure, in this case the London markets have little influence on the cultivation and management of the farm, the communication with London being by road and railway not far distant. The land is flat and well adapted for steam cultivation, which has here been introduced, and which succeeds well in dry weather, though when wet the land yields too readily to the pressure of the machine. The key to the rotation of crops is the growth of wheat every three years. Thus as a rule one-third of the farm is under wheat, one-third barley and oats, one-third beans and peas, clover, and roots. The favourite wheat here and on the best of land in Middlesex is Chidham, varied with golden drop and others. On the inferior, or land near the gravel, the rotation is varied to fallow, wheat, fallow, oats, and barley, fallow or a five course, with double fallow before the wheat crop; showing by this variation in the cropping the great difference in the quality of the soil, due to the depth of the loam by which the gravel is covered, and on which the relative fertility of the whole district is ruled.

Another instance may be adduced in which the difference of management is due partly to the inclination and antecedents of the occupier, and partly to the relative proportions of grass and arable —a farm of 350 acres, nearly half grass, chiefly an extensive paddock, either mown, or fed by a herd of about 20 dairying cows. Notwithstanding the state of the London milk trade, the farmer's former occupation having been in a dairy district, butter is made in preference to the sale of milk, the cows being grazed in the summer, and in the winter having a run; as the soil is of a nature to carry stock throughout the year, nearly all the roots are consumed by the cows and younger neat stock, bred and raised on the farm; a considerable breadth of potatoes is grown, which with peas and clover highly manured are the preparation for the wheat crop; the peas, with turnips grown in the intervals between the rows, which are sometimes taken green, are the only traces of garden cultivation, as a part of the hay and straw sold connect the cultivation with the London markets and London manure.

Though such farms as these are still to be found within the limits of the county of Middlesex, they are gradually giving place to the market garden cultivation, called forth by the increasing area and requirements of London. An increased rent, double and even treble the amount of that paid for arable farms under ordinary cultivation, is an inducement which landowners cannot well resist. Sometimes the land is planted as an orchard by the landlord, with apple, pear, cherry, and other trees at wide intervals. The land when let, is deep ploughed with a heavy dressing of manure, planted with potatoes, cabbages, or other coarser vegetables; French beans or peas with Brussels sprouts in the intervals, winter or spring onions, lettuces, wall-flowers for decorations, and all sorts of garden produce fitted for the London market are gradually introduced, and the arable farm becomes a market garden, the drawback of the distance from London not being a sufficient hindrance to the introduction of garden cultivation, which by degrees will more and more deprive the south-western limb of Middlesex of its agricultural character, so far as arable culture is concerned.

Stock.

Little interest seems to be taken in breeding or rearing stock in Middlesex. On the grass farms the grazing is confined to the after or second crop. Barnet Fair furnishes a supply of hardy Welsh and other neat cattle, well fitted to thrive on the pastures; the sheep are often of a mountain breed, though most favour seems to be shown to a half-bred sheep, having much of that

peculiarity of long-woolled breeds, the tendency to feed singly on the meadows, unlike the Downs whose gregarious habits unfit them for the purpose to which they are put by the Middlesex farmer. On the arable farms, a dry flock is kept in preference to breeding; it would not be compatible with the practice and rotation common to the farms on the best land, of growing wheat every third year, to maintain a flock on summer-grown green crops, which if raised might in most cases be sold to better advantage for the London markets. There was a branch of agricultural economy practised in the county in the days of Baird and Middleton, of which no trace now remains, namely, the breeding and suckling of house-lamb. The latter says, writing in 1813, that the practice had decreased within the then preceding twenty years, and was in his day finding a place in other counties whence they were sent in light carriages. The Dorset ewes bought at Wey Hill, and other fairs, whose tendency to early and frequent lambing is well known, fitted them for this purpose. Great pains were taken to raise the lamb dropped at Michaelmas, and sold in December. The call for very early lamb is restricted, and the raising of lambs for the market at and soon after Christmas is confined to few persons, the practice being ruled by a mild climate, and dry and kindly soil—such as parts of southern Hampshire and the Isle of Wight. The facility of transit by railway, dead or alive, from such places, gives no advantage to Middlesex raised lamb, for which the soil and system of farming are manifestly unfitted.

Woodlands.

In the northern or grass land district of the county there are some woods of considerable extent; as these are on stiff clay, or on sites covered with a thin coating of upper level gravel, it is not likely that they will be brought into cultivation; moreover, at the present time, there is a greatly increased demand for faggots. The growth is hazel, ash, birch, hornbeam, and blackthorn, from which the best and straightest are cut into stakes and headers for making hedges; the practice, however, has of late years decreased, and the pride of the hedger and ditcher is on the wane, partly because the periodical making of hedges was one of the features of agricultural economy in past generations. The hedges were allowed to stand till there was sufficient growth to pay for felling and remaking the hedge, for which the stakes and headers found a ready sale; at present, with exception of the larger poles, very much of the growth is made into faggots for domestic use, either as they are taken from the wood, or made into small bundles for kindling fires. The ready sale with which the growth of the still

remaining copses or plantations meets may be deemed a result of the demand created by the wants of London and its suburbs.

There are woods to the east, near Highgate and Enfield, but the largest in the county are the Park and other woods in the parish of Ruislip, which give a certain degree of wild and picturesque character to that district; a character enhanced by the compensation reservoir of the Grand Junction Canal, which forms a broad and handsome sheet of water between the two principal woods.

Present State of the Dairies.

Though so large a breadth of Middlesex is under grass, it is not fitted for dairying. It is not only of old custom, but because the sale of hay in the London markets is a convenient and ready way of disposing of the produce, with an easy way of maintaining the fertility of the soil by the return of dung, that the few dairy farms in the neighbourhood of London can be accounted for. The soil is essentially ill fitted to maintain dairy stock in the mode practised in the Vale of Aylesbury and other kindred districts. Indeed the system of dairies and the supply of London with milk seems to have undergone little change since the days of Baird and Wilkinson in 1793 and 1813. Baird, speaking of the cows kept at Hackney, Islington, and Paddington, describes a Mr. West as keeping at one time 999, never having attained the 1000; of these it is said 300 were in one yard, the food and method of feeding being much the same then as now; for though from 6*l.* to 10*l.* would not now represent the price of a Holderness or other in-calf cow, yet hay, grains, and turnips, with other roots, were then as now the staple of their food, varied also with vetches, cabbages, and grass, with which latter the localities named were formerly covered. Middleton, quoting a Mr. Foot, gives the number of cows kept in and on the confines of London at 7200, while Mr. Morton, in an essay read before the Society of Arts on December 13th, 1865, computes the number, before the cattle plague, at 25,000.

Mr. Morton's elaborate and well digested essay renders it impossible to advance anything new on so great and important a subject as the supply of one of the chief necessaries of life, especially of infant life, to our great and daily increasing metropolis; excepting, indeed, that he wrote of London milk which will not comprehend the country dairies, beyond those whose produce is sent as milk to London. A butter-making dairy on an arable farm has already been mentioned, but this is of an exceptional character; for there are dairies in the towns and suburban villages. They have been called into existence rather

by the necessities of localities than because the pasture is fitted for the production of milk, or the manufacture of butter. As an example; a dairy supplying milk and butter to a suburban township, about seven miles from Charing Cross, may be mentioned. The farm is under 100 acres in extent, three-fourths being grass land, on the gravel and loam which, but as accommodation land, would be more profitable under the plough, yet affording a dry lair at all seasons for the herd of under 20 cows: there is nothing remarkable in the premises or their arrangement, except that the whole management has the strictest reference to economy. As an instance, when the return load of dung is brought home from London, or elsewhere, it is not only immediately spread on the grass or arable land, but after due exposure the straw is raked from the surface of the land and used as bedding for the cows, and this to all appearance without the sacrifice of that cleanliness so essential to the health and well-being of the animals. The cows here are pastured in the summer, and have a run in the winter when the weather is favourable. Mangold, raised on the arable or bought in the neighbourhood, brewers' grains given in winter twice a day, hay, usually the second cut, or rowen, with a little meal occasionally, constitute their food. The demand for the milk leaves little to be made into butter; such is the ordinary simple management of a suburban dairy.

The disastrous cattle plague well nigh emptied the cowsheds of London and its neighbourhood. Now, at the beginning of 1868, when it may be hoped the plague is stayed, many of the sheds are nearly or quite filled, and the supply of milk is drawn in a great measure from its accustomed source. As no cows can be kept in London without a licence, these are refused in the heart of London and in crowded localities; and not only the health and condition of the cattle but the state of the sheds are under strict periodical inspection.

Several well known amateurs are assisting to supply milk from farms some little distance from London. Though they suffered in common with the regular trader in the loss of their cattle by plague, their sheds have been replenished, for the most part, with the short-horn, the standard cow of the London dairy.

The first farm is on the London clay, of which perhaps one-third, out of 350 acres, is under the plough. On this are grown mangold, cabbage, tares, clover, &c., which with the grass cut from the meadows in the summer, and the hay made on the farm, form the home grown part of the food. A part of the hay, and even straw, is sold; a certain amount of the manure, as well as the brewers' grains being brought from London. The cows are tied up as usual in pairs, in sheds, from which they are not permitted to stir, under the impression that even a

run at large in the fields would risk that condition, "which is money" in the case of the milch cow as well as of the fatting beast.

In this case the method of feeding, and the nature, quantity, and quality of the food are very much if not exactly the same as in the cowsheds in the heart of London. There is, however, at least this variation from the old management. By the well-known name "the London cow," in the Vale of Aylesbury, and other dairy districts, was understood a cow of mature age, ready to calve, or perhaps with a calf at her side: when sent to London she was milked, and being well fed, was fit for the shambles when her milk failed. In this establishment a bull is now kept, partly from general convenience, and partly from the inconvenience experienced with the herd of 100 cows in sending them from home for breeding purposes during the continuance of the plague. The daily course is as follows:—2.30 a.m., milk; 3½ a.m., bushel of brewers' grains; 5 a.m., hay, 1 truss of 56lbs. to 8 pairs of cows; breakfast; 9 a.m., water; 9½ a.m., hay; 11 a.m., cabbage, 3 bushels to 2 or an equivalent of roots, mangold or swede; 2 p.m., milk; 3 p.m., grains; 4 p.m., cabbage; 5½ p.m., hay. The milk when shed is immediately sent in a van to London, and delivered to the dairyman.

The other establishment is nearer London, though on a grass farm with less arable land. There is little difference in the management, excepting that the first period of milking is one hour later, and the feeding times are regulated accordingly. Here one of the cowsheds is of more recent construction than in the former example cited, with a middle passage towards which the heads of the double tier of cows are ranged; but the practice and arrangement are condemned by some cow-keepers, who consider that the animals are quieter in stalls with their heads facing a wall or partition.

The number of the cows is nearly 100, and a well-bred bull is kept. Both establishments are under the care of intelligent and trustworthy persons, and both are marked by cleanliness and attention to the well-being of the cows and horses, which are proportioned to the means and requirements of the farms.

London Cowsheds.

The cowsheds of London, notwithstanding the cattle plague and the refusal of licences in the more crowded and central districts, are still very numerous. As to the general question, Mr. Morton asks, "Is it better to convey the bulky supply of food to the cow with the milk at the door of the consumer, or to feed the cow where the food is at hand and convey the milk

some distance from the place where it is shed into the pail?" After careful and patient investigation, the former practice commends itself to his judgment. The population of London are probably little aware of the nature or number of the establishments whence their milk is supplied. Mr. Morton calculates that 24,000 cows supply the metropolis, not including milk sent by railway; and that in 1865 there were in 1723 cowsheds 17,622 cows. The number to which they were reduced, or the number now kept, it would be difficult to ascertain. Some cowsheds did not suffer, while others, and those not the worst arranged or apparently unwholesome, were emptied. In all probability they will regain, if not surpass, their former dimensions. Some of the smaller cowsheds, or rather stables or back premises, are entered through the dwelling-house of the dairyman. The first impression on entering is surprise at seeing cows stowed in so small a compass, and that there should be so little apparent nuisance from their presence. As may be supposed, the owners are exceedingly fond of their cattle, and as a rule take pride in their appearance and well-being. The mysteries of the milk trade are not open to the public, and must be acknowledged to be in somewhat bad repute; but there are establishments where the milk may be procured as good and pure as from a country dairy. Milk from the country has an attractive sound, but mothers of families have found that their young children have thriven on London-shed milk when that known to be from the country has produced evil effects. The sites of many large cowsheds have probably not changed since the buildings were extended to the suburban farms, on which the cows were originally grazed. In such an one there are now say 100, instead of as before the cattle plague, 180 cows, ranged in well-aired and roomy sheds, divided in pairs, and the two being fed together, parted by a low partition. As the result of inquiries as to the mode and hours of feeding, it is found that there is little difference as compared with those establishments in the country already described. If the "London" cow is kept to be milked and fatted after her last calf, some pea or bean meal is dusted into the grains, which are not readily consumed. The morning and afternoon milking are at later hours, as the customer is near at hand. Acquaintance with the management of one shed is a guide to nearly all the rest. Some grow their own grass and root-crops, and hay, others buy all at the wharf, station, or hay-market.

In a new establishment, or rather new buildings, of an old and highly respectable concern, which for generations has supplied the highest in the land, the buildings are patterns of neatness and convenience. The cow-stalls and root-stores are below;

the lofts for hay above. The cows, as elsewhere, are in pairs, facing the wall or partition for the purpose of securing quiet; the drainage is complete; all offensive matter is speedily removed; the quantity and condition of the cows are of first-rate order, with here and there a highbred short-horned heifer putting on too much flesh and fat for a milch cow, and from her early maturity and a tendency to fatten, looking more like an animal fitted for the Smithfield Cattle-show than the occupier of a stall in a London dairy cowshed.

If a question be hazarded as to the purity of the milk on leaving the cowshed, the answer is, "we cannot guarantee its purity to the consumer, because it passes into other hands after it goes from here; it is entrusted to women, mostly Irish (for the milk carriers are mostly Irish). The best way to secure their honesty, of which we have little to complain, is not to be too close in our measurement to them. There is in some cases another danger, especially in families who are rather close. Servants will sometimes make their own quantity good at the expense of the purity of that consumed upstairs."

It may be anticipated that if we are spared any future infliction of the cattle plague, the number of cows kept within the limits of London will be restored, and probably increased. The carriage by railway from distant dairies will be superseded, and the original condition of the metropolitan milk trade re-established. Those who are engaged in this occupation seem especially attached to it. The infliction of the cattle plague was at the time met, for the most part, with great patience. The trade and traders seem now to be recovering their elasticity. The Middlesex dairyman and London cowkeeper may, notwithstanding all that has been said, written, or insinuated, compare confidently in the management of and devotion to their business, with those many branches, and trades, and industries which provide the food and minister to the comforts and necessities of the largest city in the world. A visit to some of these sheds would not only tend to remove unfounded prejudices and gratify curiosity, but give pleasure and instruction to those who feel an interest in cow stock.

Land-Drainage.

The natural drainage of Middlesex, especially that part of it of which the London Clay forms the surface, is determined by the levels and undulations of that surface; the greater part of the water finding its outfall in the Brent and Yedding brooks. The amount of perennial water is very insignificant, and flows, or rather weeps, out from the beds or traces of Bagshot sands

and upper-level gravels on the higher grounds, and in dry seasons these brooks, or rather watercourses, are nearly dry. As these are the natural drains for the surface-water, so they receive the discharges from artificial drainage. The undulating condition of the surface quickens the discharge of the water that falls upon it, so that there is not such a stagnation as to cause serious inconvenience; and it is probably for this reason first that land-drainage, or rather the drainage of the subsoil, has been little practised on the clays of Middlesex. Much of the grass-land having been at one time under arable treatment is still in ridge and furrow, and in wet seasons there is unmistakable evidence that the land is not under-drained; indeed, this is often made still more evident by the opening of the furrows, so as to allow the water a freer escape from the surface. The reason of this seeming neglect of that which is now an agricultural axiom, namely, that all soils should be relieved of their water—when, as in this case, it can be effected by under-drainage—may be found in the fact that the greater part of Middlesex is under hay-farming; and so the practice, if not the prejudices, of the county are against the removal of the water, lest the land should become too dry. It must be allowed that the hay of Middlesex is often of good quality. Hendon, perhaps, produces the hay which has the best name in the market. The Hendon bent (*Cynosurus cristatus*), the crested dog's-tail, is well known to the dealers, and is seldom found except on good meadow-ground. The wet surface of the clay hinders the later autumn grazing by neat cattle or sheep; but the Middlesex farmer is content if he can secure an abundant first crop of hay, which he thinks is rather hindered than secured by under-draining. On the flat loams and gravels it is often difficult to find an outfall for land-drainage, especially when the loam is removed for the manufacture of bricks; though it is often a part of the bargain with those who have to restore the surface-soil that they should provide for the drainage by the introduction of under-drains, so that the water, always present in these soils at certain depths, may not interfere with the after-cultivation where the brick-earth has been removed.

Markets.

The markets of Middlesex, inasmuch as they are mostly metropolitan, cannot be identified with the agriculture of the county. The hay-markets are, to a certain extent, an exception; for although large quantities of hay, and especially straw, come from other counties either by road, railway, or canal, the Middlesex-grown hay is deemed inferior to none, and is generally attractive to the buyer from the care bestowed on the making.

The stock, whether neat or sheep-stock, can form but an insignificant item in the great metropolitan supply, which now, more than ever, is due to distant and foreign sources. Southall and Finchley—the former a general, the latter a market for swine—have given place to that of the metropolis, where the number of cattle each week bears a large proportion to the whole number kept within the limits of the county. The Uxbridge market is still the centre for the wheat grown in the arable portion of Middlesex and the adjoining parts of Buckingham, though as a mart for corn grown beyond those limits it has yielded to the metropolitan Corn-Exchange of Mark Lane.

The Extent of Land withdrawn from Cultivation.

Without going back to the times when, on the maps of Norden and Speed, London extended very little beyond its civic limits, and St. Martin's (Charing Cross) and St. Giles were not only in name but in fact "in the Fields"—when there was an absolute separation between London and Westminster—it is in the memory of living men that Hyde Park Corner and Tyburn turnpike were the limits of the metropolis, and that the frontages of the great thoroughfares which lead from these points—as from Islington, Stepney, and other places—were the only buildings beyond the stones. Since then, gradually the space included within these lines has been covered with buildings. The growth, here and elsewhere, of the suburbs of London is to be measured rather by square miles than by acres, so as to defy anything but a faint approximation to the real quantity taken from cultivated space. The last year has seen 925 acres so absorbed. A four-mile radius of a circle, struck from Charing Cross as a centre, describes a portion of a circle which now includes within it very little land not occupied by buildings, and beyond this large spaces are built upon. It is only thirty years since the London and Birmingham Railway was opened; since that time, from London as a centre, several of the great lines have cut through the county in various directions, occupying nearly a hundred miles in length, or about 1000 acres of land with the accessaries. The metropolitan and suburban branches, like concentric circles, are daily extending, and not only occupying a space which, all counted, may nearly equal that of the main lines, but are displacing houses which must be rebuilt elsewhere, and thus indirectly occupying space beyond their special requirements and adding serious difficulties to the problem where the poorer inhabitants are to be housed. Those formed, or projected, and in progress, may, exclusive of those parts actually in London, occupy at least 500 acres: a quantity not likely to be much

increased for the present till these are finished. It has been said that the physical and geological features and condition of Middlesex do not make it attractive as a residence for the rich. The cold clays to the north, with their lack of good water, the flat tract of loam and gravel to the south-west, with the extensive and extending manufacture of bricks, repel rather than encourage the colonization of either part of the county. Those whose business brings them only to London for the day go further afield, and on the gravel, on chalk, or such healthy subsoils, build or hire their country residence, and thus hinder the occupation of the cultivated soil of Middlesex more than might from its geographical position be expected. For some time, at least, the future of Middlesex will probably differ but little from the past. The distant hay-farms can only partially compete with those at hand; and arable farms can spare but a small part of their fodder. Arable cultivation will, no doubt, yield more and more to garden-cultivation; whilst the probable restoration of the milk-trade to London cowsheds will create an increased demand for hay from the meadows, and for root and green crops from the arable land which is so well fitted for their production and within easy distance of the market. The inevitable consequence of this will be to give a fresh impetus to the skill and enterprise of the Middlesex farmer, and tend to enhance the value of the produce and the soil of the metropolitan county.

II.—*Some of the Agricultural Lessons of* 1868. By J. Chalmers Morton.

An attempt has been made in the following pages to represent some of the leading points of the agricultural experience of the country during the remarkable summer of 1868. The general prevalence of anything unusual in the natural conditions under which the crops of any large district of various soils have been grown becomes, when its results have been carefully collected and arranged, virtually a well-arranged agricultural experiment of the highest interest, because upon the largest scale. And the produce of 1868 was, in this country, grown under conditions so extraordinary that the agricultural history of the year could thus hardly fail to be instructive.

In order to collect the facts, an inquiry was addressed to many of the leading members of the Society, asking for personal experience of the season in connexion with six distinct subjects, namely, the character of the harvest; the effect of steam cultivation; the influence of land drainage, even during drought; the extent of

autumnal and of catch-crop cultivation rendered necessary or desirable by the failure of spring-sown green crops; the alterations of cropping consequent on the failure of the clover-plant; and the means taken to supplement the diminished winter supply of food for stock. These, it was believed, were the leading topics to which an inquiry intended to elicit the agricultural lessons of the season should be addressed; and the answers to these questions form the substance of the following Report. In one or two instances the reply has been so complete a picture of agricultural improvement and experience that it has appeared best to give it separate publication; but generally the answers have been massed, their substance being extracted and arranged under the headings already given.

Before, however, proceeding with this account of the agricultural experience of England in 1868, it is proper to describe the character of the season out of which it has arisen. Stated shortly, the year was characterised especially by a warm spring and a hot, dry summer. January was very cold in the early days of the month, warmer afterwards, but colder, upon the whole, than usual. February was a remarkably warm month, often more like spring than winter. March was of average temperature and rainfall. And then come the months of our Tables, for which the reader has to thank Mr. Andrew Steinmetz, long practised in meteorological studies and observations, who has here, with the assistance of Mr. G. J. Symons's rainfall tables, collected the figures for 1868. These are printed throughout the Tables in a special type, so as at once to catch the eye. The stations selected as characteristic of the several districts into which meteorologists divide the island are given in the first column. Then come the greatest, least, and average temperatures of the month; the quantity of rain which fell, and the number of days on which it fell; the direction of the wind, and the number of days on which it blew from within the four quarters indicated. Coupled with the figures descriptive of each station are the corresponding figures, giving the average of a past series of years, either of the same station or of one as nearly as could be selected within the same district. These are printed in ordinary type, and furnish the data with which the figures of 1868 are to be compared in order to realise the distinctive character of its weather. They are taken from tables printed in the last edition of Arthur Young's 'Farmer's Calendar,' to which they were supplied by Mr. E. J. Lowe, of Highfield, Notts. Lastly, it must be added that the following are the divisions and the type-stations in England and Wales and Scotland respectively referred to in the Tables.

ENGLAND AND WALES.

No.	Division.	Counties.	Represented by.
1	Central	Middlesex	Camden Town and Greenwich.
2	S.E.	Kent, Surrey, Sussex, Hants ..	Tunbridge Wells and Worthing.
3	S. Mid.	Berks, Oxford, Bucks, &c. ..	Oxford.
4	E.	Essex, Suffolk, Norfolk, Lincoln, &c.	Norwich.
5	S.W.	Devon, Cornwall, Somerset, &c.	Sidmouth and Exeter.
6	W. Mid.	Gloucester, Hereford, &c. ..	Gloucester and Clifton.
7	N. Mid.	Derby, Stafford, Warwick, and Notts	Derby and Highfield.
8	N.W.	Lancashire, Cheshire, &c. ..	Eccles and Manchester.
9	York	York, &c...	York.
10	N.	Northumberland, Cumberland, &c.	Cockermouth, Isle of Man, and Silloth.
11	Wales	Wales	Lampeter and Llandudno.

In April, the first of the months to which the Tables refer, it will be seen that at almost every station the weather was warmer than usual; but that the rainfall, taking either its quantity or the number of days on which it fell, did not materially differ from the average. In May, on the other hand, the rainfall was considerably below the average; and the temperature was from 4° to 5° higher than usual. We had, in fact, one of the hottest Mays on record. It was a bright sunshiny month; and much drier, in fact, than the figures indicate, because of the prevalence of clear skies and drying winds. June was again a remarkably dry month, with not one-third the usual number of rainy days, nor one-third the usual quantity of rainfall. The drought continued during July; showers were merely local. At Camden Town and Greenwich, the rainfall was only 0·5 in. and 0·13 in. respectively. At Gloucester, Derby, and Manchester, it was 0·8, 0·3, and 0·4 inches. The only rain-gauges on the list which contained much water were filled, for the most part, by thunder-showers, representing only local downfall of very little agricultural serviceableness. The number of rainy days was 3, 4, 5, in place of the usual 10, 12, 16. The temperature, too, was from 3° to 8° above the average; so that, the evaporation being largely in excess, the little rain that fell did not penetrate the soil. During August, notwithstanding heavy rains and a nearly average number of rainy days, the soil had been so hot and dry that the rain could not sink into it. The temperature was still somewhat in excess of the average; and, though the rainfall was nearly as much as usual, and was sufficient to sprout a good deal of outlying barley in the West of England, yet August was felt in most districts to have been a dry month, and the ground broke up hard and lumpy under the plough. September was again a very hot month

ENGLAND AND WALES.

	April.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
ENGLAND.	°	°	°		inches.				
Camden Town .. (1868)	63·8	30·5	49·0	12	1·5	11	5	9	5
Greenwich .. (average)	79·0	25·3	45·7	13	1·8	..	..	..	..
Tunbridge Wells (1868)	68·6	31·1	48·1	12	2·4	8	6	10	6
Worthing .. .. (average)	64·4	30·0	45·6	11	1·9	..	..	..	..
Oxford .. .. (1868)	64·9	23·7	48·2	13	1·8	9	5	7	9
Oxford .. .. (average)	74·5	25·0	45·6	12	1·8	..	..	..	..
Norwich .. .. (1868)	64·5	32·0	47·0	10	1·8	9	4	8	9
Norwich .. .. (average)	76·0	21·0	44·7	12	1·8	..	..	..	..
Sidmouth .. .. (1868)	65·3	29·4	47·7	11	2·6	11	2	3	14
Exeter .. . (average)	72·9	25·0	47·8	16	2·8	..	..	..	..
Gloucester .. (1868)	68·0	29·0	48·4	8	1·6	8	7	5	10
Clifton .. .. (average)	73·5	24·2	45·5	13	2·2	..	..	..	..
Derby .. .. (1868)	65·0	26·0	47·9	14	1·6	8	5	4	13
Highfield, Notts (average)	79·0	21·0	47·3	16	1·8	..	..	..	..
Eccles .. .. (1868)	63·9	27·8	46·2	16	1·5	7	5	6	12
Manchester .. (average)	79·0	22·8	45·6	13	1·8	..	..	..	..
York .. .. .. (1868)	64·5	27·0	46·0	17	1·8	3	8	10	9
York .. .. .. (average)	73·0	23·0	46·1	12	1·6	..	..	..	..
North Shields .. (1868)	65·6	29·5	44·8	18	3·0	11	4	5	10
North Shields .. (average)	71·8	25·0	44·2	17	1·9	..	..	..	..
Cockermouth .. (1868)	62·2	27·3	46·7	13	3·1	6	4	6	14
Isle of Man .. (average)	70·1	26·8	43·7	11	2·3	..	..	..	..
Silloth .. .. (1868)	63·5	30·0	47·6	13	3·0	4	6	6	14
Silloth .. .. (average)	72·9	24·0	45·6	10	1·8	..	..	..	..
WALES.									
Lampeter .. .. (1868)	71·2	23·5	48·2	10	2·7	8	4	7	11
Lampeter .. .. (average)	75·4	21·8	44·5	14	3·4	..	..	..	..
Llandudno .. (1868)	65·2	32·0	48·5	11	1·1	2	7	0	21

ENGLAND AND WALES—*continued.*

	MAY.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
ENGLAND.	°	°	°		inches.				
Camden Town (1868)	87·6	35·6	58·0	6	1·6	6	7	14	4
Greenwich .. (average)	86·2	28·3	52·6	13	2·2	90 years observation.			
Tunbridge Wells (1868)	86·0	38·0	48·1	12	2·4	4	9	12	6
Worthing .. (average)	73·4	32·0	50·8	11	2·4	8 years observation.			
Oxford .. (1868)	84·5	33·2	57·5	10	0·6	3	6	14	8
Oxford .. (average)	81·1	27·7	52·4	13	1·9	33 years observation.			
Norwich .. (1868)	83·0	36·0	57·3	7	0·9	4	7	14	6
Norwich .. (average)	87·0	28·0	50·8	13	2·1	20 years observation.			
Sidmouth .. (1868)	72·5	36·6	53·4	10	1·4	3	3	12	13
Exeter .. (average)	83·0	31·0	53·1	15	2·3	13 years observation.			
Gloucester (1868)	82·0	39·0	58·5	9	1·8	3	5	7	16
Clifton .. (average)	82·8	28·8	50·9	16	2·7	8 years observation.			
Derby .. (1868)	83·0	37·0	57·3	11	1·4	1	4	15	11
Highfield, Notts (average)	84·5	26·8	53·1	13	1·9	51 years observation.			
Eccles .. (1868)	82·5	32·9	55·3	12	1·0	4	5	11	11
Manchester (average)	84·0	24·0	51·8	14	1·8	11 years observation.			
York .. .. (1868)	81·5	35·5	55·3	8	1·3	0	7	17	7
York .. .. (average)	80·0	25·0	51·5	13	1·8	20 years observation.			
North Shields (1868)	71·0	32·0	52·5	10	1·0	2	5	18	6
North Shields (average)	75·8	27·5	48·8	18	2·3	15 years observation.			
Cockermouth (1868)	71·9	33·2	53·7	18	3·2	3	3	11	14
Isle of Man (average)	78·0	29·4	47·7	11	1·9	7 years observation.			
Silloth .. (1868)	71·6	31·6	53·6	17	2·5	2	4	9	16
Silloth .. (average)	79·2	35·0	50·3	12	1·8	7 years observation.			
WALES.									
Lampeter .. (1868)	77·4	35·0	55·2	11	2·1	3	7	15	6
Lampeter .. (average)	..	..	..	..	..	6 years observation.			
Llandudno .. (1868)	77·2	37·3	55·0	9	0·7	1	9	4	17

ENGLAND AND WALES—*continued.*

	June.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
ENGLAND.	°	°	°		inches.				
Camden Town .. (1868)	87·8	44·6	62·4	4	0·8	12	4	6	8
Greenwich .. (average)	94·5	36·2	58·0	12	2·1	..	..	..	..
Tunbridge Wells (1868)	86·5	42·1	61·5	5	0·5	7	4	7	12
Worthing .. .. (average)	76·6	40·5	57·5	11	2·2	..	..	..	..
Oxford .. .. (1868)	84·6	39·1	61·7	5	0·9	6	3	7	14
Oxford .. .. (average)	90·0	37·1	58·1	13	2·7	..	..	..	..
Norwich .. .. (1868)	82·0	42·2	60·7	5	0·7	5	6	9	10
Norwich .. .. (average)	90·0	38·0	57·6	9	2·1	..	..	..	..
Sidmouth .. .. (1868)	75·0	42·0	53·0	2	0·6	7	2	4	17
Exeter .. .. (average)	87·0	39·4	58·3	15	2·6	..	..	..	..
Gloucester .. (1868)	86·0	39·5	61·3	3	0·1	8	6	2	14
Clifton .. .. (average)	86·2	38·3	35·9	15	3·2	..	..	..	..
Derby .. .. (1868)	86·0	42·0	62·3	5	0·3	7	3	4	16
Highfield, Notts (average)	92·0	35·1	58·7	13	2·8	..	..	..	..
Eccles .. .. (1868)	85·7	37·8	57·5	8	0·7	5	2	4	19
Manchester .. (average)	91·2	35·0	58·4	16	3·3	..	..	..	..
York .. .. .. (1868)	81·0	43·0	58·7	6	1·3	5	3	9	13
York .. .. .. (average)	86·0	32·0	57·3	13	2·5	..	..	..	..
North Shields .. (1868)	73·0	41·3	56·5	5	0·4	8	4	7	11
North Shields .. (average)	80·3	37·2	55·7	17	3·3	..	..	..	..
Cockermouth .. (1868)	81·8	41·4	56·9	7	1·3	2	3	7	18
Isle of Man .. (average)	82·2	39·0	53·9	14	2·4	..	..	..	..
Silloth .. .. (1868)	84·0	38·5	57·4	7	1·0	0	5	9	16
Silloth .. .. (average)	81·0	35·5	57·2	13	2·4	..	..	..	..
WALES.									
Llandudno .. (1868)	81·0	42·0	58·8	4	0·2	2	3	2	23
Lampeter .. .. (1868)	82·0	35·2	57·6	3	0·4	6	5	7	12
Lampeter .. .. (average)	91·0	33·0	56·2	7	3·6	..	..	..	..

ENGLAND AND WALES—*continued.*

	JULY.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
	°	°	°		inches.				
ENGLAND.									
Camden Town (1868)	93·0	48·0	67·8	4	0·5	10	6	2	7
Greenwich (average)	93·5	38·9	61·3	12	2·7	90 years observation.			
Tunbridge Wells (1868)	92·4	44·8	66·2	4	2·7	10	7	5	9
Worthing .. .. (average)	82·5	42·6	61·1	10	1·6	8 years observation.			
Oxford .. .. (1868)	90·0	45·2	66·5	8	1·9	13	5	4	9
Oxford .. (average)	88·3	42·0	61·2	12	3·0	33 years observation.			
Norwich .. .. (1868)	87·5	50·5	64·8	5	1·5	12	5	4	10
Norwich .. .. (average)	86·0	39·0	61·9	11	2·7	20 years observation.			
Sidmouth .. .. (1868)	80·2	52·0	64·0	8	0·0	0	4	9	12
Exeter .. .. (average)	89·7	43·5	62·2	15	2·1	13 years observation.			
Gloucester .. (1868)	94·0	46·0	68·5	3	0·8	9	10	2	10
Clifton .. .. (average)	86·6	41·3	60·3	15	2·8	8 years observation.			
Derby .. .. (1868)	92·0	47·0	66·3	4	0·3	9	8	4	10
Highfield, Notts. (average)	91·0	36·3	61·3	15	2·5	51 years observation.			
Eccles .. .. (1868)	89·6	42·0	63·3	5	0·4	11	6	2	12
Manchester .. (average)	89·5	37·3	60·5	16	2·9	11 years observation.			
York .. .. .. (1868)	86·0	46·0	62·9	2	0·4	9	8	9	5
York .. .. .. (average)	87·0	40·0	59·7	12	2·6	20 years observation.			
North Shields .. (1868)	83·3	47·8	59·3	7	0·5	9	7	6	9
North Shields .. (average)	81·4	41·8	58·3	18	3·4	15 years observation.			
Cockermouth .. (1868)	85·8	42·8	62·3	5	0·8	4	4	6	15
Isle of Man .. (average)	77·4	39·0	56·9	11	2·0	7 years observation.			
Silloth .. .. (1868)	84·5	43·8	61·5	5	0·7	2	12	8	9
Silloth .. .. (average)	83·1	39·8	58·5	13	3·1	7 years observation.			
WALES.									
Llandudno .. (1868)	88·6	47·0	64·8	4	0·3	6	10	2	13
Lampeter .. .. (1868)	89·8	37·0	63·0	6	1·2	9	10	5	7
Lampeter .. .. (average)	89·0	38·8	59·0	11	2·7	6 years observation.			

ENGLAND AND WALES—*continued.*

	August.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
ENGLAND.	°	°	°		inches.				
Camden Town .. (1868)	88·2	46·0	63·3	12	2·3	13	7	5	6
Greenwich .. (average)	92·0	48·0	60·5	12	2·3	..	..	..	..
Tunbridge Wells (1868)	87·5	46·5	62·5	15	3·5	5	5	10	11
Worthing .. .. (average)	81·1	45·7	61·2	11	2·5	..	..	..	..
Oxford .. .. (1868)	88·6	47·5	62·8	16	3·4	4	4	12	11
Oxford .. .. (average)	83·0	36·7	60·1	13	2·7	..	..	..	..
Norwich .. .. (1868)	84·5	48·0	63·3	11	2·3	12	5	4	10
Norwich .. .. (average)	89·0	41·0	60·4	13	2·7	..	..	..	..
Sidmouth .. .. (1868)	77·6	47·5	60·4	14	3·8	8	1	7	15
Exeter .. .. (average)	91·0	44·6	62·2	17	2·1	..	..	..	..
Gloucester .. (1868)	91·0	45·0	66·5	15	3·3	8	6	5	12
Clifton .. ..(average)	91·4	39·4	60·2	15	3·6	..	..	..	..
Derby .. .. (1868)	89·0	46·0	62·0	16	3·1	4	3	11	13
Highfield, Notts. (average)	92·5	34·2	60·3	17	3·2	..	..	..	..
Eccles .. .. (1868)	91·3	44·9	61·3	21	3·1	5	6	6	14
Manchester .. (average)	88·2	42·0	..	17	3·9	..	..	..	..
York .. .. .. (1868)	85·0	46·0	61·2	11	2·6	0	11	8	12
York .. .. ..(average)	84·0	36·0	59·1	13	2·9	..	..	..	..
North Shields .. (1868)	77·8	45·0	59·0	16	1·9	5	4	8	14
North Shields ..(average)	79·0	39·0	57·7	18	3·6	..	..	..	..
Cockermouth .. (1868)	89·3	43·0	61·3	18	4·1	3	8	6	14
Isle of Man .. (average)	82·1	40·0	57·8	12	2·7	..	..	..	..
Silloth .. .. (1868)	89·1	42·5	60·7	7	4·2	2	10	8	11
Silloth .. .. (average)	82·9	40·2	58·4	14	3·8	..	..	..	..
WALES.									
Llandudno .. (1868)	93·0	50·5	62·0	14	1·7	4	5	4	18
Lampeter .. .. (1868)	89·0	36·0	59·0	11	4·3	2	7	10	12
Lampeter .. .. (average)	89·0	38·8	59·2	11	2·7	..	..	..	..

ENGLAND AND WALES—*continued.*

	SEPTEMBER.								
	Temperature.			Rain.		Wind.			
	Max.	Min.	Mean.	Days.	Depth.	N.	E.	S.	W.
ENGLAND.	°	°	°		inches.				
Camden Town .. (1868)	91·0	43·0	60·2	11	1·7	14	9	4	3
Greenwich .. (average)	86·4	32·0	56·3	13	2·2	90 years observation.			
Tunbridge Wells (1868)	87·5	46·2	59·7	12	3·0	8	10	8	4
Worthing .. .. (average)	75·6	41·2	57·7	13	2·7	8 years observation.			
Oxford .. .. (1868)	88·5	38·1	58·3	11	4·0	6	10	10	4
Oxford .. .. (average)	80·4	29·6	55·0	11	2·9	33 years observation.			
Norwich .. .. (1868)	87·8	44·2	59·6	8	2·4	10	6	8	6
Norwich .. ..(average)	80·0	33·0	55·5	12	2·4	20 years observation.			
Sidmouth .. .. (1868)	74·0	46·3	58·9	18	5·3	3	11	12	4
Exeter .. .. (average)	82·6	38·8	58·3	17	1·8	13 years observation.			
Gloucester .. (1868)	86·0	41·0	59·8	10	2·2	5	11	6	8
Clifton .. .. (average)	91·9	39·4	60·2	15	3·6	8 years observation.			
Derby .. .. (1868)	85·0	44·0	58·0	10	1·7	6	12	7	5
Highfield, Notts. (average)	85·0	32·0	56·6	12	2·6	51 years observation.			
Eccles .. .. (1868)	88·1	38·7	57·6	10	1·9	8	8	6	8
Manchester .. (average)	85·5	30·2	55·3	14	2·8	11 years observation.			
York .. .. .. (1868)	83·0	41·5	50·7	15	3·2	1	16	10	3
York .. .. .. (average)	79·0	30·0	54·2	12	2·1	20 years observation.			
North Shields .. (1868)	81·6	45·0	55·2	20	3·6	7	8	9	6
North Shields .. (average)	74·6	32·2	54·2	15	3·5	15 years observation.			
Cockermouth .. (1868)	82·5	35·8	56·6	9	1·9	4	11	8	7
Isle of Man .. (average)	73·5	38·0	55·0	11	2·2	7 years observation.			
Silloth .. .. (1868)	84·0	34·3	55·6	9	2·0	3	15	5	7
Silloth .. .. (average)	76·1	31·8	54·3	17	3·7	7 years observation.			
WALES.									
Llandudno .. (1868)	87·5	43·5	58·7	7	1·8	3	15	3	9
Lampeter .. .. (1868)	86·5	35·0	57·9	10	3·9	2	21	4	3
Lampeter .. .. (average)	86·6	25·8	55·4	15	3·9	6 years observation.			

month, and the first fortnight of it was dry. For the rest of the year, it may be said—of October that it was both warmer and dryer than usual—of November, that it gave us again a rainfall much below the average (one-half the average at Chiswick)—of December, that it was one of the warmest, stormiest, wettest Decembers on record. On the whole, and owing chiefly to the first and last months of the twelve, 1868 has not fallen, so much as had been supposed, below the average of past years as regards its rainfall; but the great deficiency of the supply during those months when evaporation is most active, which during 1868 were unusually bright and hot, will cause the year to be remembered as characterised by one of the severest summer droughts on record. It is the influence of this drought on the agricultural experience of the year that has now to be described.

The Harvest of 1868 was one of the earliest ever known; and as regards the wheat-crop on all wheat-soils, it was probably one of the most productive on record. The quality of the grain, too, has proved unusually good. The barley and oat crops, and those of peas and beans, on the other hand, were generally deficient. The exceptions here have been on the early sown heavy soils of Kent and Essex, on which barley is a crop of the regular rotation, and where it has yielded during the past year a most valuable and abundant produce. And the exception to the general excellence of the wheat-crop has been on the spring-sown lighter soils which had produced an abundant green-crop in 1867, not fed off till late in the following spring. The crops cut for hay, both of clover and old meadow, were shorter than usual; and the subsequent growth during July, August, and September, was hardly anything. Nothing was more remarkable than the withered and even burned up appearance of the pastures all over the Southern and Midland counties. The more deeply-rooted plants, whether thistles or elm-trees, stood out with quite startling verdure amidst the parched surface on which everything else was bleached so nearly to a woollen whiteness, that, at a little distance, a sheep was to be detected on the pasture rather by its shadow than its outline. Never before had the generally green surface of the island borne such a desert hue, and never had railway passengers beheld such widely-spread destruction from the scattered ashes of the engine-fires. The fen and moor-land districts were burning sometimes for miles together, and even amidst the grass-fields of fertile Midland counties the destruction often extended over acres and along hedgerows for hundreds of yards on either side of the railways. The later sown green-crops were universally a failure. The returns before me are from nearly every county in the island, and the testimony to this effect is almost unanimous. The earliest sown mangold wurzels and kohl-rabi, together with what

turnips, mustard, rape, and other catch crops could be got on the stubbles after harvest, were almost the sole provision of green food for the winter keep of stock. The regular turnip break of all light land farms was last year a blank. In North Wilts the competition for Mr. Sotheron Estcourt's prize of 25*l.* for the best five acres of Swedish turnips, grown with artificial manure alone, realised an average crop of only $9\frac{3}{4}$ tons per acre, the weight on the unmanured acres averaging only 5 tons 8 cwts. The cost of the artificial manure employed averaged 1*l.* 15*s.* 6*d.* per acre; so that in the nine instances reported by Mr. William Spearing, to whom the award of the premium had been left, an extra produce of 39 tons of roots was obtained on the 9 acres whose crop was ascertained, by the use of 16*l.* worth of artificial fertilisers. The swedes thus grown cost 8*s.* 3*d.* a ton in manure alone, a fact quite enough to prove that on all light soils, such as those reported on by Mr. Spearing, succulent growth by the aid of dry manure is unprofitable in such a dry season as we had last year. On heavy lands, again, the superiority exhibited in the case of all early sown crops, which had already obtained complete root-hold of the soil and subsoil before the drought began, entirely disappeared wherever the seed-bed was not completely ready before the end of May; and all attempts to obtain a crop of swedes and turnips on such soils last year were failures. It is perhaps hardly necessary that I should quote the letters of correspondents on the subject. It will suffice if the words of Mr. Lawes, in his article on "Home Produce" in the last volume of the 'Journal,' be referred to in confirmation of the account thus given of the crops of 1868.*

Land Drainage and Steam Tillage.

On these subjects, and their relations to the drought of 1868, the following questions were distributed:—

On Land Drainage:—Are there instances known to you of differences, as regards productiveness during so dry a season, between drained and undrained land, either arable or pasture? If so, please to give a particular history of them.

On Steam Cultivation:—Has deeply stirred and steam cultivated land suffered more or less than others from the drought? Describe any instances in detail.

It is plain that it is through their influence on the depth and thoroughness of tilth that both land drainage and steam cultivation influence fertility; and the answers to these questions may, therefore, be properly considered and arranged together. It is

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* *See* Table opposite p. 362, vol. iv., New Series.

not to be supposed that a wet field, drained last spring and thus provided with so many additional exit holes below for the water which it held, would thereby be enabled the better to resist a drought which was drying it above. Neither can any one imagine that to break and stir and turn up deeply, whether by horse-power or by steam, any kind of soil during drought would not facilitate the drying process. The probability contemplated by the questions was, that both drainage and steam cultivation, by enabling deep and thorough cultivation, would, wherever they had been in operation for some seasons, have so enlarged the storehouse of moisture and of fertilising matter within the soil; and, by multiplying the inner surface presented throughout the substance of the soil, thus deeply drained and tilled, would have so increased the holding power of the storeroom thus enlarged, as to have proved a help against the drought. And this probability has been abundantly justified by the answers that have been received. Wherever the greater depth of land laid open to tillage operations by deep drainage had been properly worked —whether by steam-power or otherwise—for two or three years before 1868, the drought was effectually withstood. On grass land, of course, the deepening of the soil and its improvement by land drainage goes on more slowly than on ploughed land; and drained grass lands, equally with undrained, were burnt up last August; but they were not generally cracked so deeply, nor did they suffer so immediately, nor were they so long in recovering on the return of rain. On the clay arable lands of the country, on the other hand, there is not a doubt that deep drainage, two or three years old, proved very beneficial last year. Such lands were cultivated earlier in the season, and a deep tilth was thus obtained before the drought set in. They did not crack so much, or they did not crack at all. They were not so dry at a given depth as soils which had been wet; on which, therefore, the plough could not work until the drought had already come, and which were consequently cracked and fissured everywhere. Stiff soils, drained and cultivated, did indeed last year retain, up till the latest of the drought, moisture enough to feed all the early sown crops, whose root-system had sufficiently developed before the dry weather of Midsummer. And thus wheat and the earlier sown barleys, and even mangold-wurzel, yielded heavy crops on such lands wherever the plant as well as the soil had been managed properly. The explanation is simple enough. The quantity of water and of fertilising matter which a soil will hold depends on the extent within the soil of that surface of all its particles, by the attractive force of which this water and this fertilising matter are retained. Deepen the soil by drainage, and reduce it to tilth by cultivation deep enough, and you thus

multiply the quantity of feeding ground to which the roots of plants have access, and on the quantity and wealth of which fertility depends. But, be the explanation what it may, the evidence is unquestionable that the drought of 1868 had more injurious influence on soils whose stores of food for plants lay within the shallow layer to which their usually wet condition had confined the cultivator, than on soils where deep land-drainage had both naturally spread the fertilising matter throughout soil and subsoil, and enabled a still more thorough artificial distribution of it by deeper cultivation.

The following report by Mr. Paget, of Ruddington Grange, near Nottingham, may be taken for an example. He says :—

"I have had a favourable opportunity this year of noticing the effect of draining. There is here a district divided by a stream for about four miles. On the right side of the brook the land is well drained, while on the left it is wet and undrained. The drainage was completed in some parts forty years since, while in others it was only commenced five years ago. The district comprises both arable and grass land. The soil of the arable land is generally gravelly loam resting on a marl, and affords examples both of shallow and of deep draining. Where there is no under water except at a great depth, and the soil is too impervious to allow the rain water to escape with sufficient rapidity, tiles were put in forty-five years ago, chiefly at a depth of 30 inches, but occasionally at 4 feet. They have remained perfectly efficient, and I have never discovered any advantage in the greater depth. In other parts drains have been put in at a depth of from 4 to 6 feet,—some of them by Elkington, others at different times during the last forty years. These drains carry off the overflow of a 'water table'* supplied from below, so that moisture is always within reach of the deep rooted plants, such as mangold, beans, and clover. The crops have in no case suffered from the drainage, whether shallow or deep. The soil at the end of July was moist at a few inches depth in the mangold, bean, and cabbage plots; and the corn stacks in the drained district contrast favourably with those in the undrained. But where the water table was only a few feet from the surface, and the plants were always within reach of sufficient moisture, the crops were very good; the mangold attaining 35, and in one instance 45 tons to the acre, and the beans having a fair quantity of straw. The meadow land is chiefly a deposit from brooks descending from hills of the lias and red sandstone formations, and is a clayey loam. It is naturally very wet, but has been drained at depths varying from 4 to 8 feet. No amount of rain renders it unfit for stock unless accompanied by a flood; and twelve hours after the subsidence of a flood there is no trace of it except in its deposit. On comparing these meadows with the undrained grass on the other side of the brook, I believe that where the land had been very recently drained, and consequently the grasses proper to dry land were not fully established, they did not afford quite so much 'keep' as the corresponding undrained land; but as soon as the rain fell in August the advantage was on the side of the drained land. Those meadows which had been long drained had the advantage throughout, and where mowed, produced

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* This term is no doubt intended to convey the idea (probably the fact), that there is at a varying depth, within or below all soils, a surface, up to which water stands in a free and liquid form, and above which it is drawn by capillary attraction, moistening without wetting, being mingled with air as well as earth.—J.C.M

two-thirds of an average crop, and where depastured never lost a tinge of green.—I have not cultivated by steam; but having secured a deep tilth by subsoiling every fourth year for twenty years at least, I am satisfied that I derived advantage in the two last years, one being very wet and the other very dry, from the friable state of the subsoil."

Mr. Paget adds:—

"In Transylvania such a summer as we have passed through this year is by no means uncommon; and I have noticed that white clover and grasses of the best quality grow very luxuriantly there, when the water table is not more than 2 feet from the surface. An intelligent agriculturist there expressed his conviction that to reduce the level to 4 feet below the surface would be injurious where the evaporation was so rapid as it is there. If this opinion is well founded, perhaps different rules ought to be applied to our dry Eastern Counties and the moist West; but my experience here does not confirm it. I have meadows where the supply of water to the drains is constant, in which the pipes are laid at depths varying from 3 feet 6 inches to 8 feet, and I fail to discover any advantage in the shallow drainage during the heats of this summer. I have never seen permanent bad effects from over drainage. One field drained in 1863 became bare in May 1865; but in the autumn of that year it was covered with white clover, and it has now a good sward. I attribute this effect to the death of carex, and of the water grasses which before occupied the surface. It is now well worth twice the rent compared with its former value. I have also satisfied myself that some drains which carry off the overflowing of the water table will cease to run when the evaporation is very rapid, and recommence on the recurrence of the soft moist wind without rain which often accompanies a falling barometer. This accounts for a phenomenon which some years ago puzzled draining engineers."

The next witness I shall call is Mr. Smith, of Woolstone, than whom no one is better qualified to speak of the advantages of steam cultivation. He combines with his statement on this head some useful information also on the effects of land drainage during the late drought. He first describes his farm:—

"My farm, containing 112 acres of arable and 60 of grass land, consists of two distinct qualities of soil. The valley land is mixed gravel and clay. I have generally called it light land; it is, however, by no means light working land for ordinary horse culture; it always needed three horses to plough it. The hill land is very heavy clay.—On grass land hereabouts the drained and undrained fields were both alike burnt up. I could not see that either of them had any advantage over the other in contending with the dryness of the summer. On arable land, that which was drained had the advantage, and greatly so in all cases,—in the wheat crop, to the extent of more than a quarter per acre. All the crops on well drained land were fine and full, whereas all the crops on undrained land were thin on the ground, and nothing like so bulky when cut, yet they ripened well. The effect of drainage upon the bean crop was very perceptible, for on the undrained lands they burnt up very early in the season; whereas on the well drained land they did not burn up so quickly: and on my own well drained and deeply cultivated lands they stood out to the last ten days before harvest, and I had the honour of having the best beans in the neighbourhood this dry summer, the result of drainage and deep steam cultivation. I can, however, give you one instance of drainage having done an injury to a good meadow. Forty years ago a mill in the adjoining parish was pulled down. I have a meadow that

floods in the winter, and had always been mown. It is situated half a mile above this mill; and as soon as the mill was pulled down, this meadow gave a less produce than it had done before by more than half a ton per acre yearly; and it continued to do so for fifteen years, until a weir was put up holding the water to the height it stood before the mill was removed; and then the meadow at once returned to its increased productiveness, and it has continued so ever since. Side main drains have been put in, so that the uplands are all well drained, although the water in the river stands at its former height.—The deep stirring of my land by steam power has enabled it to withstand the drought better than shallow horse-worked land had done. This was clearly shown in my bean crop. They were planted at the same time that the neighbouring horse-farmers planted theirs, yet they came up first and kept first. They stood 5 feet high, and were well corned, and kept green longer than those on horse-worked land did, and were much the best crop in the neighbourhood."

The history of the river-side meadow, given by Mr. Smith, can hardly be taken, I think, to prove an injury by land-drainage. Some of the advantages of the water-course being obstructed by the mill, to which he testifies have, no doubt, arisen from the top-dressings which the land obtained by winter floods, which were lost when the obstruction to which they were owing was removed. But even if we are to attribute the present heavier grass crops and those of former years to the higher "water table," as Mr. Paget calls it, within the soil, which is created by the impounded river, it is by no means certain that a different management of the land after the water had been permanently lowered, would not have resulted in still greater fertility. There is many an agricultural operation beneficial under proper management, of which those who maintain the old management under the new conditions, are unable to realise the advantage. To one instance of this, reference will be made hereafter; and this may be another. It is possible that if the Woolstone meadow, instead of being annually mown when thus incidentally laid dry, had been annually grazed, the report of its tenant might have been different.

The following are shorter communications on the same subjects—land-drainage and deep-tillage:—

Captain Dashwood, of Kirtlington, Oxford, occupies two farms comprising 1072 acres, of which 927 are arable, and 100 meadow or pasture. The soil is on the limestone formation, commonly called *stonebrash*. He says, that though unable to give particular instances, he believes his crops on land well drained have been superior to those of neighbouring fields on soil of a similar quality, but badly drained. His conviction is, that land overcharged with water for part of the year must suffer the most in a dry summer like that of 1868. And as to steam-cultivation: having cultivated by steam-power for some years he is convinced that deeply-stirred land has undoubtedly suffered less from the drought. Horse-hoeing the corn and thus keeping the surface in tilth, prevented the land from drying up and cracking.

In the same county Mr. Savidge, of Sarsden Lodge Farm, Chipping Norton, believes that if the gentlemen who conducted the steam-plough inspections for our society could have gone their rounds again last autumn, they must have returned with a load of useful information, for never did deeply stirred steam cultivation do so well. He adds :—"I fear in some districts during the long dry time, many began to think they had over-drained some of their land, and at agricultural meetings (Warwick to wit) during August and September, several speakers stated that it had been over done, and that we were suffering from that. My own experience is, that in no season did good deep draining tell a better tale; and we have a fine prospect upon such land for the next crop."

Mr. Mitchell, of Rainham, farming on the edge of the Thames-side marsh lands, Essex, describes an example, in which the effects of both deep-tillage and of drainage are singularly combined; for he refers to the appearance of the crop directly over the line of a freshly made deep drain, cut so lately as last spring. Its purpose was to carry off the water from a low lying pasture, and it had to be taken through a field of higher land, apparently dry. Both over the drain and for some distance on each side of it the mangold crop was finer than on any other portion of the field.

Mr. Coleman, late of Woburn, now writing from Park Nook, near Derby, says:—

"I have noticed that in this dry season very much of the land that has been drained during the past two or three years bore much better crops than usual, and did not seem so much affected by the dry weather as the adjoining fields, which are still undrained. The drained land did not crack so much, nor were the cracks so wide or deep as upon the undrained portions; and I may safely say that the drained land was moister than the undrained during the latter part of the summer. Some boggy land certainly produced more herbage than usual, and this is the only case I noticed of undrained land being more productive than that which had been drained."

The following is a report from the "Britannia" Farm of Messrs. Howard, Bedford:—

"The soil is a stiff retentive clay, which under the old shallow horse culture was very hard working (requiring three or four horses to a plough), and not very productive. After deep drainage and deep cultivation by steam power the land has become much more porous and productive, and the water gets very quickly into the drains. Although the real nature of the soil is not altered, the appearance of it is much so, and the greatly increased productiveness is beyond all doubt. Some parts of it are of so strong a clay, that if a small hole is dug, the friction of the spade in making it causes it, when filled with water, to retain it for almost any length of time. Under the old system the treading of the horses up the furrows, even when drained, caused the water to stand upon the surface for some time after a heavy rain; now, although the land is laid perfectly flat, without a single open furrow, no water is ever seen to stand. We cannot speak from experience on our own

farm of any contrast between drained and undrained land last year. But there was an example plain enough on the farm adjoining, in a field next to one of ours, which was wheat last season, the whole of it being farmed alike in every way, both as to manuring, tillage, and drilling of the seed, except that part was drained. On that portion of the field the plant all through the winter looked the strongest, healthiest, and best colour; in the spring it grew earlier, and kept its superiority up till harvest, when it was evident to any passer-by that there must be a quarter of wheat more to the acre, and about half a load more straw than in the rest of the field undrained. That which was the wettest in winter suffered the most from the drought in summer, it having cracked so much more. Our experience is that the wetter the land in winter the wider the cracks when exposed to the summer's sun. There were many instances last summer of fissures three to four inches wide, and three to four feet deep. A few years ago we had two fields of wheat adjoining, one drained, the other undrained; both were good crops, but the drained field, although all had been drilled together, was ready for harvest fully a week earlier than the undrained field. Ours is emphatically a steam cultivated farm, the whole of the breaking up of the land being done and the seed beds formed by steam power; and our experience is that very deeply cultivated land suffers much less from drought, as well as from wet. On our stiff soil the deeper it is broken up the greater amount of moisture it will retain; and the quicker the extra water is drawn away, the lighter it leaves the soil, and the more the roots of the corn will penetrate. The sun also has not such a baking effect: whilst it dries, it does not harden in the same unyielding manner as it does the ground under the shallow cultivation. One of our fields cropped with wheat this season has never been inverted for the last eight years; the crop was a remarkably heavy one, there being as much as could possibly stand; notwithstanding the dryness of the season, it was much laid in places, and at harvest many competent judges estimated it at six to seven quarters to the acre. The past summer was exceedingly favourable for steam cultivation. The long dry, hot weather made the land so rotten and friable, that we were able to prepare most of our seed beds at one operation with the cultivator, nothing more being done to them before drilling and harrowing in the seed."

From Foulness, Mr. Harvey has sent the following report, which describes an experience on low-lying alluvial land :—

"The land of this island has all been redeemed from the sea, and consists of a mixed soil on the east and south next the river Thames, and a heavier, stiffer soil on the north and west next the rivers Crouch and Roach. Land draining has only just begun, but as far as I can see it has done good, even during this dry year. Land that has all the water drained out of it in winter does not dry up so hard in drought. It is in a more kindly state for the roots to work in, and does not crack so much as when it is undrained, therefore holds the moisture better in hot seasons like the one just past. My land, which has been steam cultivated, has, I think, withstood the dry weather better than the land that has not been done. I have as good, if not better, fields of mangolds this year on steamed land than I have generally grown."

Mr. Bailey Denton, of 22, Whitehall-place, S.W., has kindly taken great interest in the inquiry to which the above have been replies. Having taken pains to inquire among people of information what has been the relative produce in 1868 of drained and undrained lands of similar quality and with similar climate, he has found the general opinion to be, that in spite of the excessive

drought, more corn and grass were produced on drained land where the work had been efficiently done for some years than on undrained land. His own observations have led to the conclusion that in corn lands generally, and in grass lands of fair quality, there has been more and better produce than on similar lands undrained.

The following are the replies of some of Mr. Denton's correspondents. Mr. Wortley of South Collingham, Newark, says,—

"With the exceptions hereafter noticed, my belief has always been that the underdraining of wet land, whether arable or grass, increases the productive power, even in such seasons as the last; the advantage being most apparent in the arable land, but on the whole very decided (taking the improved quality of the herbage into account) in the case of grass. Since I received your circular I have been receiving rents on an estate in Wilts, on which during the last eight or ten years I have done a good deal of draining. It comprises one parish, entirely dairy land, on the Oxford clay; another parish and part of a third on the chalk, comprising a large area of grass on the chalk marl, the undrained part of which at times is very wet; a fourth parish, and part of a fifth, on the middle oolite, varying from the thinnest 'stonebrash' with springs breaking out on the hill sides, to the heaviest clay. Bearing your circular in mind, I asked most of the tenants separately whether during the past season they would rather have had the pipes in their land or not; there was all but a common consent among them, including even the small dairy farmers, that the land was better for having been drained. I must say in conclusion, that according to my experience there is some foundation for the popular belief that a certain kind of grass land is injured by underdraining; that is to say, the inferior plants which previously made a show, if they did little more, are destroyed by the drainage, and they are very slowly replaced by better if the land is left to itself. I ought to add also, though it does not touch the question as to underdraining, that in my opinion some fen land (arable) is injured if the water is altogether removed from it; though a certain amount of drainage is, of course, essential."

Mr. James Rawlence, of Salisbury says :—

"I quite think with you that more corn and grass have been grown on drained than on undrained land, except on grass land that had been drained in the previous autumn, in which case the aquatic plants all died out from the long drought and heat, and the more nutritious grasses had not time to fill up their places; besides which, no fissures had been made by the contraction of the soil, and, therefore, it had not become aerated, which is one of the benefits of thorough draining, and one which enables strong clay land to withstand the ill effects of a long drought."

Lastly, Mr. Castree, of Gloucester, may be quoted :—

"The dry and hot summer of this year has not yet shown its full effect on drained grass land; former hot seasons dried up and withered the grass lands for the season, but in subsequent years the herbage was much improved in quality by the roasting it had undergone.

"The drained clay lands have not been so much cracked as the undrained, and have been more verdant.

"The meadows on the banks of the Severn are improved by draining off water that lies in hollow places, or wet places; but drainage is no improvement of sound meadow or pasture land."

There is thus a general concurrence of testimony to the fact

that both deep cultivation and thorough land drainage have contributed to fertility, even during such a drought as that of 1868; the latter both directly, wherever it had been long in operation, by the gradually deepening cultivation effected by the passage of rain water through soil and subsoil, and the deepening, therefore, of the area to which the roots of plants extended in search of food, and, also, indirectly, by preparing both soil and subsoil for their deeper cultivation by steam power.

I have kept three additional witnesses till the last, as their evidence, though hardly dissentient from what has been already given, may yet be classed together, as representing exceptions to the general rule. It will be acknowledged that they are all excellent and trustworthy observers.—Mr. Clare Sewell Read, M.P., occupying land at Honingham Thorpe, near Norwich, varying from a stiff soil to a light sandy loam says:—

"I have two marshes drained by a windmill: one lies higher than the other and generally grows a fine crop of grass: the other is lower, and grows but little grass, and that sour stuff. This year the high marsh is burnt up and the lower one grew more grass and of better quality than usual.

"Last autumn I ploughed deeply by steam, and also dug (with Fowler's plough and Cotgreave's *digging* mouldboards) a quantity of land 12 inches deep. This was a clay loam and the barley on it was an excellent crop. The wheat and winter oats after the deep steam ploughing were also very good. I have, however, seen deep steam culture in the spring entirely destroy all reasonable hopes of a root crop, not only this year, but in the average run of seasons."

Mr. J. J. Rowley, of Rowthorne, Chesterfield, whose farm is on the edge of the magnesian limestone, part of it being old grass over the coal-formation, says:—

"I have every reason to believe that drained grass land has suffered less from the drought of the present year than undrained lands chiefly because the latter began to crack the soonest; the open fissures in this kind of land before the rains, were remarkable. Even now [December 14th], from their depth and width, the cracks are not yet closed. The cracks on the well drained loams were small in comparison and are now closed up.

"There is little or no steam cultivation on our thin limestones. On a farm near to me the turnip fallows were steam cultivated in the autumn of last year, and the turnips are a complete failure. On the adjoining lands, cultivated in the ordinary way, there is a partial crop only;—perhaps one-quarter of a crop. The roots are generally a failing crop in the district. I am, however, satisfied that the greater amount of evaporation occasioned by deep cultivation is damaging to the turnip crop. This I have seen after a shallow subsoil ploughing."

Mr. Rowley also declares that the 4-feet drainage sanctioned by the Inclosure Commissioners, in his neighbourhood, has not been successful.—Mr. Henry Evershed, late of Halstead, writes as follows:—

"On a farm in this parish the wheat suffers greatly from being sopped in water during wet winters. This year the yield is very great, and land that

is undrained, and usually much injured by the retention of the surface water, has not suffered this season. There are many marked instances of this kind within my knowledge. It is probable that the crop, on undrained heavy land, is so much the greater this year because of the small amount of plant-food removed by the small crops of ordinary years.—As regards steam cultivation deep tillage must be useless in many cases; for instance on thin chalks, and—speaking of anything over the usual depth of good cultivation, say 6 inches or 8 inches—I have found it so on poor clays, sand clays, gravel clays, and soils generally with poor subsoils. Such soils are often improved under deep cultivation, subsoiling, &c., *with* high farming; but would they not have been equally improved by the high farming without the deep cultivation? Has the latter paid its cost? In many cases I believe not. The crops have been increased by a variety of means on my farm, and deep cultivation by steam, by plough, and by spade, has been tried without distinct benefit. A friend who farms on the chalk,—which is covered, however, by several feet of earth of very mixed character, varying from light land to stiff clay,—subsoiled a strip across a large field, cutting through his mixed soils; no benefit was observed. On the adjoining farm subsoiling was practised on a large scale without advantage—no experiments could be more comprehensive and conclusive or adverse to deep cultivation on that land. A field of mixed loamy land in this neighbourhood was partly cultivated, and in dry weather, by steam, during an agricultural meeting. A subsoiler made very deep and efficient work, but the subsequent crops have not been the better for the operation. Deep cultivation by the spade, in cottagers' gardens, would tell a different tale if it were not for the pig, the road scrapings, the ashes, the night soil, and the enormous dressings which follow the spade."

I do not think that either the facts or the opinions here advanced can outweigh the evidence already given in favour of deep drainage and deep tillage, supported as that is by the enormous probability in favour of the deeper, fuller storehouse of food for plants outlasting any other during an exhausting drought. Among the *facts* are the history of Mr. Read's lower marsh and his instances of injury from deep spring cultivation—Mr. Rowley's case of turnip failure, last year, after steam-cultivation during the previous autumn; and his general observation of the failure of 4-foot drainage—also Mr. Evershed's example of superior wheat, last year, from water-sopped clay land; and his instances of the failure of deep cultivation on various soils.

Amongst the *opinions* are Mr. Rowley's impression that there is a greater amount of evaporation from lands that are deeply stirred and cultivated; and Mr. Evershed's idea that poor wet clays benefit in drought, owing to their ordinary yield having been a comparatively small draught upon their resources.

Mr. Read's marsh land most likely benefited by the higher "water-table" underneath it, due to standing water in its neighbourhood; and his experience of the advantages of deep cultivation, properly conducted, is perfectly consistent with the fact that it has been found injurious to the current crop to plough up soil and subsoil in the spring of the year. Mr. Rowley's instance of a total failure of the turnip-crop, last year, cannot be considered

as a stigma on any preceding peculiarity of management whatever. The turnip-crop was almost universally, last year, as great a failure under good management as under bad. Nothing sown in June, 1868, had any chance of growing, whether the land had been deeply tilled or not. His belief that the greater amount of evaporation occasioned by deep cultivation is damaging to the turnip-crop ought to have been preceded by a proof that the assumed increase of evaporation is a fact. The probabilities are all against it. The last showers before the drought left undrained clay land in a waterlogged condition. This water all escaped by evaporation; and the subsoil, if any of it could get there, was searched by deep fissures. The case in favour of deep drainage and deep tillage is, that the last showers before the drought sank into soils so treated beyond the reach of evaporation, where the roots of plants already were at work to use them, and where no cracks could reach them. Mr. Rowley's examples of the failure of 4-feet drainage, and Mr. Evershed's instances of the failure of deep tillage, have, I think, considerable light thrown upon them by Mr. Evershed's own concluding sentence. These examples, like that of the Woolstone meadow, seem to me to prove that the true opinion of any agricultural operation, defended by one farmer and condemned by another, can be gathered only in those places where the full use has been made of the advantages it offers, and where due regard has been paid to the subsequent management of the land. There is many an example of deep drainage having failed through the poaching and mismanagement of subsequent shallow cultivation. And, from Mr. Evershed's reference to the garden tillage of the cottager with his pigstye, we may properly infer that there are instances of deep cultivation proving useless simply from the tenant having failed to treat his doubled land with corresponding liberality. He has virtually doubled his field by the double depth of its cultivation, and it needs an almost corresponding increase of capital to "stock" it properly, or so as to do it justice. Notwithstanding, therefore, the exceptional examples referred to by Mr. Read, M.P., Mr. Rowley, and Mr. Evershed, I believe that the testimony thus presented to the reader is conclusive of the fact that deep drainage and deep tillage are conducive to fertility, not only during seasons of unusual rainfall, but during seasons of unusual drought.

Altered Cropping.

Proceeding from the soil to the plant, I have now to collate those parts of the correspondence before me which convey the lessons of last year's drought upon the cropping of the land. The power of a deeply-rooted plant to resist the drought, is one

of the most useful of them, and it has been illustrated by the general account already given of the agricultural produce of the year. The advantages of early sowing, which enables spring sown crops to get deeply rooted before summer, were never more apparent than last year. And many a useful crop of mangold wurzel was secured by having been well rooted before May. In spite, however, of the promptest and most active management, there was a very common failure of the young clover plant last year, and an almost universal failure of the turnip crop; and to these two circumstances the "altered cropping" of 1868 and 1869 is mainly due. The turnip crop is the chief winter maintenance of the live-stock of the farm, and the clover crop is at once, to a large extent, the next summer's maintenance, and the surety for the wheat crop of the following year. The keep of the whole year, and the character of a whole succeeding rotation of crops, were thus imperilled by the drought; and it was to elicit information on these two points that the following questions were distributed:—

On Autumn Cultivation and Catch Crops.—What attempts have been made by late or stubble sowings to provide green food during the coming winter and early spring? Which of the sowings are most likely to prove serviceable—white mustard, rape, stubble turnips, Italian ryegrass, trifolium, rye, or any other?

On Alterations of Cropping.—If the young clovers have failed, are you keeping the old clovers on over 1869? and what alterations in the rotation of crops during that and the next year or two shall you have to make?

To these questions a number of answers have been received, and to some of them the attention of the reader has now to be directed. It is not supposed that much in the way of direct instruction will be derived from their perusal. Farmers are everywhere already wide awake in an emergency like that which last year befel them. From one leading seedsman I learn that, immediately after harvest, an extraordinary demand set in for mustard, rape, Trifolium incarnatum, stubble turnips, Italian ryegrass, and grass seeds, for early spring-keep. From another I hear that they sold of such seeds one-sixth more in June, 1868, than in June, 1867, two-thirds more in July, 1868, than in July, 1867, eight times as much in August, 1868, as in August, 1867, three times as much in September, and twice as much in October. And another correspondent, writing from Norfolk, having been twenty-four years in the seed-trade, says, "Never do I remember to have sold so much seed after harvest for sowing for winter and spring-keep for cattle." It is plain, then, that English agriculturists need no Agricultural Society or Agricultural Journal to teach them what to do in a difficulty like that of 1868. There is, however, always some service done by placing

unusual experience upon record: and if only for the sake of the juniors among themselves, I have now to give the following extracts from my letters. Taking the first from Norfolk, as the home of English turnip husbandry, the following is a quotation from a report by Mr. C. S. Read, M.P. He says of his own farm and the district around Norwich:—

"I have sown rye, vetches, winter-oats, trifolium, rape, mustard, turnips, trefoil, &c., for spring and autumn feed. The early sown mustard is now (November) very fair, being folded off with sheep, and makes nice feed; but what was not sown till some time after harvest did not come up till the October rains set in. The stubble turnips are sown broadcast (with 1 cwt. of guano, 1 of superphosphate, and 2 of salt), and will with the shelled corn that has sprung up, make some nice feed for the ewes and lambs, though the early frosts will prevent the turnips coming to any size. I fear all the clovers, trefoils, &c., that I have resown are cut off. Some were scorched up by the heat of the September sun, and what few weakly plants survived that second drought are now being devoured by insects. I hope this failure is not general, as a great many thousands of acres in Norfolk have been resown with grass seeds this autumn at a vast outlay to the farmer. Rye, vetches, &c., look well, and the trifolium is also a good strong plant. But I am inclined to think stubble turnips will make the best and earliest spring feed, where sown in time on warm lands.

"I have not an acre of young clover on my farm, notwithstanding a second sowing the last week in August. Where there is any old sainfoin lea, it is generally saved for another year, and I have left some clover lea that I intended for wheat. I have sown one field wheat after wheat, another will be barley after barley, and in another I shall plant barley after wheat. I have sown some winter beans, and shall grow a few peas where some of the young clovers have failed; but the larger breadth being now under green crop will be eaten off in the spring, and will be followed by roots. The result will be a short breadth of wheat, a large one of barley; hardly any new clover next year for feed or hay, and a larger extent of green crop and roots. (The two years' lea will bear a crop of wheat followed by barley before turnips.) As I can farm as I like, I have 'chopped' the crops about as I please; but more generally I think the failure of the young seeds will result in a generally increased acreage of beans and peas next year, so the four course rotation will not be much interfered with."

In the same county, Mr. John Hudson, of Castle Acre, very early took the alarm, and in a letter written to the agricultural papers in August, said, that when his wheat and barley were cut, he found the young seeds in the latter all dead from the drought, and no feed in the wheat stubbles, so he at once bought up all the sainfoin-seed he could find, and also large quantities of Italian rye-grass seed, and as soon as the land was cleared of the corn crop he set the broadcast-machine to work, and two drills upon the barley stubble—the first sowing 1 bushel an acre of the rye-grass seed, the latter putting in the sainfoin-seed between the drills of barley stubble at the rate of nearly 3 bushels an acre—rolling both in with a 3-horse iron roller. The sainfoin came up well. This he did over about 120 acres, and thereafter the remainder of what should have been the new clover lea was dibbled

with 6 pecks an acre of winter tares, with Newberry's dibbling-machine, which takes five rows at a time, 8 inches from row to row, and 6 inches from hole to hole; and then a three-horse rib-roller was passed over them, closing all the holes in without disturbing any of the young clover that might by chance be alive. Upon the wheat stubbles he put in new rape-seed, white mustard-seed, and buckwheat for autumn feed for his flock of 600 breeding ewes to go on to. In July the small-seed drill with 10 coulters 12 inches apart was put across the ridges where the swedes were sown (as the swedes did not come up), putting in green-round turnip seed; and by the end of August they were fit for the hoe, and promised a good deal of feed over 120 acres in the spring.

Writing on November 7th, Mr. Hudson had to say that his root crops were so much improved during the previous six weeks, that he expected to be able to keep his sheep through the winter and spring in the usual way.

Mr. W. Cubitt, of Bacton Abbey, North Walsham, another Norfolk witness, says:—

"Green crops are more or less a failure. Sixty acres of wheat stubble on this farm were ploughed up immediately after harvest, sown with 2 cwts. per acre of superphosphate, and drilled with green-round turnip seed; but owing to the autumn drought, and subsequently the cold rains and frosty nights, they made no progress, indeed are of little or no value. Rape-seed shared a similar fate, but white mustard succeeded better, and has produced some amount of sheep food. Trifolium, Italian rye-grass, and winter tares, have been sown to a limited extent, and are promising.

"On this, and many other farms, the young clovers and other artificial grasses were a general failure; but it is a fact worthy of note that in all cases where these seeds were sown immediately after the barley in the months of February and March, and deeply buried, they stood well. In the majority of cases where they failed the land was resown after harvest with an admixture of Italian rye-grass, trefoil, and red suckling:—they vegetated after the first rain, but perished during the three weeks drought which followed, those sown later as upon this farm did not vegetate till the second rain after the harvest, and now show themselves thickly; but it is doubtful if they will not succumb to the first severe frost."

The following is a very useful report from Bedfordshire. Mr. Charles Howard, of Biddenham, sends the following account of his experience during the past autumn. He says:—

"The green crops were almost an entire failure, a few pieces of mangold-wurzel were to be seen here and there; our old friend the swede could not put in an appearance. There are a few pieces also of kohl-rabi, which were useful to transplant from after the rains at the latter end of August. I was fortunate to have some pieces from which I transplanted 12 or 14 acres of land which had been sown with wurzels. These are growing well now, and will be some good keep in the spring. After the rains, farmers were busy in every direction in seeding all the root crop land with either rape or white turnips, and a good deal of keep is the consequence.

"I never knew a season when so much preparation for spring keep was

made. A great extent of the stubbles has been turned up and planted with mustard, rape, and turnips, either mixed or alone. I have sown 20 acres with Essex dwarf rape, which promises to make some keep; also 13 or 14 with Italian rye-grass and rape mixed; this does not show much at present, but I believe it will do well in the spring. The rape and the stubble turnips will be found most serviceable. Mustard does not stand for much at this period of the year; besides the winter will affect it. There have, however, been some excellent crops of it this autumn after peas, and sheep have done well upon it. Cabbages are also being planted out. If of an early variety, they will be fit for use in May next. I shall have 10 or 12 acres of Early York and Sutton's Imperial, which I hope will serve me during the months of May, June, July, and August, after which time we get plenty of keep. I had 8 acres this summer, and had it not been for them I cannot tell how I could have managed my stock; as sheep, pigs, and shorthorns, were all glad of them. I am now eating off the second shoot or 'sprouts,' and an abundance of keep I have. I think as a rule farmers do not cultivate this plant so much as they should; it can be managed to come in all the year round, at any time the farmer requires the most keep: in my case I have to provide for the summer months. Nothing grows more keep; it is beautiful food; and above all I know of no plant that can be cultivated more cheaply according to its weight, if only set about in the right way.

"Most of the land which had been sown in the spring with clover has been resown in most cases with an admixture of Italian rye grass, trefoil, trifolium, together with either white or red clover. I fear, however, that not much good will come of it, as the very severe frost about October 20, must have destroyed the young and tender plants. Many farmers have left a portion of their old clovers where good; much however completely died away during the drought. I cannot say what others will do as regards the rotation of crops; in my own case having left 16 acres of old clover I shall to that extent omit the turnip crop and take barley after the wheat: the land will be in good condition after two years of clover lea, and with a good dressing of farmyard manure for the barley, it will be none the worse."

The cabbage crop, to which Mr. Howard refers, seems to be a great resource on the stiffer class of soils: witness Mr. Randell's experience of it as related in his report at the end of this Paper. And the following is a note from an almost neighbouring farm. Mr. Henry Hudson, of Pershore, Worcestershire, in a letter dated December 3rd, says:—

"I planted trifolium, red clover, Italian rye-grass, white mustard, rape, stubble turnip, rye, and winter oats to provide food during the coming winter and early spring; and to these I added 140,000 cabbage plants of the early sorts. The trifolium is looking very well, the red clover is weak and uncertain, the Italian rye-grass good, the mustard very indifferent for want of rain. The rape has proved a failure from the same cause. Stubble turnips are magnificent, never better; rye and winter oats and vetches are very promising: all on various soils, light and strong loams, and clays."

The following is a note from Mr. J. Rowley, of Rowthorne, Chesterfield:—

"The early harvest enabled farmers to fallow and clean stubbles to a great extent. Wherever the clovers had failed, the stubbles were resown with clovers as in spring, and have done very well, the mild weather having suited them. But many farmers waited the result of the change of the weather hoping the young clovers would recover. Time has shown the plant the

present season to be a failure; and thousands of acres of barley stubble are bare. These barley stubbles will in many instances be resown with barley perhaps to be resown with clover. In some instances where the land is in high condition, barley stubbles will be sown with rape and mustard, with a few tares to afford early eating for sheep, and as a preparation for wheat. Barley must be sown somewhere, and the bulk of the mixed turnip lands having been sown with wheat, farmers have to set aside the usual course of cropping, and repeat barley on barley. The old clovers, which would have been sown with wheat the present season, are held on another year to afford pasturage, or for mowing. In some instances, wheat is sown on a fallowed wheat stubble, but this is not common. The quantity of wheat sown in the district is equal to former years, and it looks very well. Perhaps the forced change in the course of cropping may be productive of good and relieve the land of the prevailing clover sickness."

The following are shorter memoranda. Mr. Cobban, writing from Lord Ducie's farm at Whitfield, Gloucestershire, says:—

"Mustard, rape, trifolium, rye, Italian rye-grass, and stubble turnips have been sown in this neighbourhood for winter and early spring feed. My opinion is that stubble turnips, rape, and rye, will be the most useful, as they are of earlier and quicker growth than trifolium or Italian rye-grass; mustard cannot be depended upon after November as the frost will destroy it. As soon as the rye gets up about a foot or 18 inches high, we mow a portion every day, and cut it into chaff to mix with dry food; a plan which greatly economises a scanty root crop, and helps to carry us on till the Italian rye-grass is ready."

Captain Dashwood, of Kirtlington, Oxfordshire, says:—

"In this district many attempts have been made to provide green food during the coming winter and spring. I should say the stubble turnip will of the sowings turn out of most use, as the bulbs if of any size will produce top in the spring.

"I have sown nothing contrary to my usual custom, except trifolium, and that is to replace the clovers that have failed completely—this trifolium I shall follow with rape. I have also had to resow my Italian rye-grass of which I always grow a few acres for spring feed for the lambs.

"I always grow a certain proportion of sainfoin, as the limestone soil is very suitable for it. Being consequently to a certain extent independent of the clover crop, I have not kept down the old clovers. I shall therefore not have to make any alteration in my system.

"As to my rotation I now have none, except that one-sixth of my arable land (45 acres of sainfoin deducted) is in root crops, and one-twelfth in clover. The other nine-twelfths are cropped with corn according to the condition and quality of the land."

Mr. A. S. Ruston, of Aylesby, Chatteris, writing from the Cambridgeshire Fens, says:—

"This not being a turnip country, and consequently not much of a sheep-breeding country, but little autumn sowing on the stubbles has been done, except to resow the clovers and rye-grasses, the spring sowings having been nearly all destroyed by drought. Nearly the whole of the stubbles have thus been resown; and the seeds are now up, and promise to stand the winter well. Tares and rye have been sown to a greater extent than usual, but it is rather for food for horses another spring and summer, than for sheep food during the winter. A good many of the fallows which should have been sown with coleseed in July, had the weather permitted, have been sown in August and

September with coleseed and white mustard, and are presenting a full plant, and look healthy; but will eat away very quickly. White mustard has afforded as much keeping as anything where sown so late; but its liability to be destroyed by frost renders it of but little use except for early feeding. Several fields of old seeds are left over in consequence of the failure of the young seeds in the stubbles, and the doubt as to whether those resown will be strong enough to stand the winter. But in this county we are not strictly tied to system, so that probably no two men will pursue a like course of cropping where they have left their old seeds unploughed. I can therefore give no definite information as to the future cropping of such lands."

The following is from Mr. Savidge, of Sarsden, Oxfordshire:—

"I never saw at the end of harvest a worse prospect for the flocks and herds. But by repeated sowings a good half crop of turnips and other keep has come forward, and indeed we have more than a full crop of shed-barley and oats.

"Abundance of stubble turnips, rape, &c., has been sown for winter and early spring feed, and perhaps in no season was such a breadth of white mustard planted. Some pieces are remarkably fine, but after all it is poor stuff to make mutton. The young seeds are all but a failure—both spring and autumn sowings. Many pieces of old seeds will be allowed to remain to carry on the stock through next summer."

Lastly, from North Lincolnshire, Mr. Sowerby, of Aylesby, sends the following report:—

"As to the turnips, our principal green crop, they were almost a complete failure until the 11th of August, when we had the first good rain. About and a few days after that date, I sowed the whole of mine the third time over, and they have done remarkably well, but, of course, are only just starting to bulb. It all depends upon the next six weeks, and should it keep open weather that time we may have more than could have been expected. I do not think I can speak quite so favourably of the whole of our district, for I observe a good deal of bare ground. A good deal of white mustard and rape have been sown upon the fallow break, which will afford some autumn food.

"In many fields the young clovers have failed altogether; in most cases those fields will be sown again with corn, and the one-year seeds be allowed to lie another year. This will keep the same quantities of corn and turnips for following years, but alter the course for the present, in one case two crops of corn together, and the other, two years' seeds. Time will bring them right, only in the meantime the cropping will be altered."

Among the details of instruction which our correspondents give is the value of cabbages as a cattle food; the serviceableness of having seed beds of such plants to prick out should other crops fail; the superiority of early sown stubble-turnips in an emergency of this kind over mustard, and even, excepting clay soils, over rape. There is also the general rule against despair, which last year received so remarkable an illustration. The prospect was bad enough when Mr. John Hudson wrote to describe all the methods he was adopting in the face of it; but before winter had arrived he was able to say that things had improved so much that his farm stock would be kept much as usual through the winter. Mr. C. Lawrence, of Cirencester, late a member of the Council of the Royal Agricultural Society, has

told me that towards the end of July, when the harvest was progressing, observing the failure of the root-crop, and of the seeds sown with the spring corn, he urged every farmer he met with to set the plough to work to turn up lightly every portion of uncropped land in readiness for sowing turnips when rain should come, as the ground would then be in a forcing condition, and insure abundant plant. He was particularly induced to urge this, on being told it would be too late, from having sown turnips on land on which vetches had been fed off by sheep at the end of July, 1867, when rain came opportunely. The crop was so uniform over the whole field, and excited so much observation, that the produce of an average portion was weighed, and yielded the extraordinary weight of 24 tons 16 cwt. per acre in the month of December, leaving some unconsumed by a very large stock at Lady-day. A remarkably mild winter has, in fact, so helped those who had striven to help themselves, that the great difficulties foretold of the season have not generally happened.

The chief lesson * of these letters, however, is, I suppose, to

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* Among the less general but still important lessons of the season were all those examples of the artificial supply of water during drought, which were furnished by water-meadows, by sewage-irrigation, and by the practice of so-called water-drilling. It may be stated that, as a rule, the leading lesson here has been the worthlessness of any other watering than that supplied in enormous quantity by ordinary gravitation. There are many farmers now—Mr. A. S. Ruston, of Aylesby, Chatteris, is one of them—who make a regular practice of washing in their seed of all kinds with the water-drill; and they generally realise an advantage more than enough to justify the extra cost of the process. But a seed-time during and preceding drought is certain to be a failure, in spite of petty waterings by water-cart in this way. And Mr. Chandler, of Aldbourne, who was the introducer of the water-drill, candidly writes to me as follows:—

"The total failure of the turnip-crop this season includes, of course, those drilled with water equally with those put in by the compost-drills. The exceptions in either case are where swedes or turnips had been sown very early. We have some on this farm drilled in May that have produced about one-third of a crop. Part was drilled with tank-liquor and superphosphate, the other part with ashes and pig-dung. I have looked many times to discover where the one ended and the other began; I cannot see the slightest difference. Twenty years' experience has confirmed my early impressions that a warm wet season is most favourable for the water-drill. The past season consequently could not be otherwise than detrimental."

And the worthlessness of small dressings of water during a drought is equally certain during the growth of the plant as well as at the sprouting of its seed. All attempts at merely refreshing plants by squirting water, whether it be pure or sewage-water, over them, in comparatively small quantities, are necessarily failures during a prolonged drought. The only serviceable watering in such a case is that which takes place as in water-meadows where land, especially laid out to enable the self-distribution of the dressing, receives 300 to 500 tons per acre—a quantity corresponding to a layer from 3 to 5 inches thick, which soaks the soil from 12 to 15 inches deep. Mr. Cyrus Combes, of Tisbury, Wiltshire, than whom there is no higher authority on the subject of irrigation, says of the water-meadows around Salisbury in 1868:—

"Water-meadows were exceedingly valuable during the last summer drought. When the pastures were burnt up the water-meadows were beautifully green.

be read in their exposure of the folly of binding tenants to a rigid rule of cropping in the cultivation of their land. Thus Mr. Savidge, of Sarsden, who, with others, relates what has been done in the way of replacing failing green crops, and what has yet to be done, in the cropping of the coming year, in order to avert the difficulties which the drought has raised exclaims:—"How much to be pitied are those who are tied down to a system of farming, under which they have no chance but, win or lose, to go round with the wheel. Surely 1868 will convince all who have tried to draw up fitting farm agreements, specifying rotations of crops, that to farm well, so as to meet pressing wants, is a subject hard to deal with. How happy those must feel in such a season as the past, and indeed in every season, who are left to do the best they can."—And it is, I think, plain enough, from what has been already said by correspondents, that this liberty need involve no harm to the owner of the land. The live stock of the farm which is his great security for the maintenance of its fertility, is now happily even on the plough-lands of the country, so large a portion of the farmer's capital, that the provision to be made for it is as much a landlord's as a tenant's question. The steam-cultivator and the manure manufacturer come to the rescue of both, when the main root-crop of one year, and the main clover-crop of the following year together fail. The deep and thorough tillage of our clay lands during the drought of 1868 will, no doubt, influence their fertility for years to come; and the bare fallow in place of fallow crops, enforced last year upon our lighter soils, followed as it has largely been by abundant late green crops, owing their produce rather to the air than soil, will be equally beneficial. The large dressings, too, of guano, superphosphate, and other imported fertilisers which

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Dairies kept on farms containing no watered-meadows produced very little cheese and butter, and owing to the scarcity of green food the cattle were fed with hay at a great expense, whilst cows fed on the irrigated lands were unaffected by the dry weather.—Irrigation may be said to increase the value of pasture-land 100 to 200 per cent. in ordinary years. Last year I consider an acre of water-meadow was worth at least 4 acres of pasture-land."

To this I only add that last year was also remarkable for the superiority of sewaged lands over fields receiving dressings of ordinary dry manure. The dry season enabled the successful application of sewage to seed crops as well as crops of succulent growth. Five and a half quarters of wheat were grown per acre on Lodge Farm near Barking on a poor gravelly soil which had borne wheat in 1867, and had had no other dressing than two dressings of sewage of about 400 tons per acre each, in April and May of 1868. Heavy crops of mangold wurzels, cabbages, and potatoes, also of turnips and grass, were produced on land not naturally rich, much of it very poor, which had received no other dressing than sewage, and which had been robbed of heavy crops the previous year. In all these cases two and three dressings (more in case of the grass) of from 300 to 500 tons per acre each had been applied. But these are quantities so great as to preclude the idea of any other mode of application than by ordinary gravitation over sloping surfaces from a higher level.—J. C. M.

have been added to the land, will balance any immediate draught upon its resources due to departures from established rotations. Many fields of old clover will lie over for another year in place of the young clovers which have perished. The wheat crop which should have been taken there will be taken in the place of barley after turnips, and the displaced barley will in many cases be taken on the barley stubbles where the clover should have been. Or peas or winter beans may be taken on the barley stubbles, and thus possibly a diminished area of barley may follow in 1869. Anyhow we have in deep and thorough tillage, and in our ample stores of manufactured and imported fertilisers, ample means wherewith to ensure good crops, in whatever order they may be taken. And there ought now to be nothing in our farm agreements to hinder, as Mr. Savidge says, the farmer from doing always the best he can.

ALTERED LIVE-STOCK MANAGEMENT.

The statements of correspondents regarding their plans for tiding over the winter with their live-stock have yet to be presented to the reader. The inquiries addressed to them about the influence of the drought, related successively to the soil, the plants, and the animals of the farm; and it is to the third section of the subject that I have now to direct attention.

The following was the question put:—

Winter Food.—Please to state in detail how you shall provide for your live stock during the coming winter. Any information arising out of past experience of feeding cattle or sheep in a year of short supplies, and any account of your plans for economizing or supplementing the store of cattle food, and generally for making up for a very deficient turnip and mangold crop, will be thankfully received.

To this a number of valuable replies have been sent to me. The following history, as good an example as any of "information arising out of past experience in a year of short supplies," is given by Mr. Cobban, Lord Ducie's agent in Gloucestershire:—

"The year of 1864 was one of more gloomy prospects as regards the wintering of our flocks and herds than the present, for then we had neither swedes nor turnips (except a few on the stubbles for spring feed), and but very few mangolds. We had, however, about 2½ acres of cow cabbages, which proved of great value; we began to use them in November when the cattle were brought into the yards. The hearts were cut through a turnip-cutter and then mixed with hay chaff which had been scalded with boiling linseed tea at the rate of about a gallon per head; an allowance of barley and pea meal was then equally spread over the heap; and the whole was well mixed up and let remain two or three hours, after which it was served to the fatting cattle at the rate of a bushel basketful to each beast, enough being mixed at once to last all day. After the best of the cabbages were consumed we began the mangolds, which were pulped and mixed in the same way. Each beast

had about fifty pounds per day, or less than half the usual allowance. For the store cattle we adopted the following plan: we had a quantity of rough potatoes which were boiled with some linseed, and, after being mashed up, the soup was thrown over chaff, three parts of straw and one of hay; some malt-dust was also strewn over the heap to season it, and a few brewers' grains. The whole was then well mixed up and thrown into a heap and served out to the cattle three times a day. I never saw the beasts do better than they did that year.

"For the fatting sheep we had clover-hay chaff with grains and an allowance of ground corn all mixed well together and served to them fresh three times a day. The store sheep had half hay and half straw-chaff mixed with grains and a little malt-dust. The ewes had a plentiful supply of good hay up till within a week of lambing, when, in addition, they had half a cart-load of mangolds daily amongst 180, which was increased to a whole load as they got used to them. We had several acres of rape, stubble turnips, and rye, for early spring feed, and these we found very useful for the ewes after lambing. The above is as nearly as possible the plan of feeding which we adopted in a year of even shorter supplies than the present one, and we shall adopt it again this year so far as we find it necessary."

A good many, however, have this year cut the knot of their difficulty rather than attempt untying it. As there was little cattle-food in the country, the demands upon it were reduced, the stock being sold half fat at a loss. Thus Mr. W. Bulstrode, of Maidenhead, reports of his neighbourhood:—

"The alarm created early in the autumn induced graziers to keep their stock much lower than usual; and the nature of the season since having promoted such unusual growth, at a time when it was little expected, the difficulty will not now be great in this district, which is not a breeding one."

And Mr. Sowerby, of Aylesby, in North Lincolnshire, reports:—

"As to sheep I think we have about half less left for wintering than we usually have. *Tens of thousands* of lambs have gone to market lean and slaughtered that would have come out in the spring, and numbers will go before Christmas. As to what sheep remain, we live in hopes the young turnips will yet come to something; should they fail us, our breeding ewes must be kept upon grass land and get corn and cake; feeding sheep must be limited in the quantity of turnips, and supplemented largely with the cheapest feeding stuffs we can buy; and I do not think anything is better than linseed and cotton-cake. No doubt large numbers of sheep will keep coming to market in a half fat state; as has been the case for some time. This must trespass on our future supplies, for should other counties have made away with their young sheep as we have, we must feel the want of them next spring."

In Norfolk, Mr. Cubitt tells me that on the large flock farms of that county many sent their hoggets half fat to market, realising for them about one-half to two-thirds their cost price in the spring of the year. In Yorkshire, Mr. Outhwaite, of Bainesse, tells of a similar enforced sale of stock; though not of quite so disastrous a retreat in the face of threatening difficulty. He says:—

"The greatest portion of the young sheep in this district have been sold to the butcher. Those which were not ready for such purpose have to be kept

entirely on forced meat, such as 'chop,' Indian meal, linseed cake, and locust beans."

Mr. Moore, Lord Radnor's agent, near Farringdon, speaks of a somewhat similar experience :—

"Our plan has been to dispose of everything we could possibly get fit for slaughtering. Fat beasts were forced through the autumn and are all cleared out—the same with the sheep; and the wether lambs, which could not be sold as stores without great loss, are now [December] being regularly drafted for butcher, and are paying pretty well for their keep. We hope to clear out in a month ready for lambing time. We preferred forcing them all through the season to having them on hand this winter. In doing this we have mixed various descriptions of corn (beans, peas, barley, oats) and cake. For store stock we propose using straw and hay, cut into chaff, with a few mangold-wurzel. Ewes will be done as usual; as we have a good stock of mangold-wurzel. We give them a little hay now whilst running on the grass lands. They come gradually to mangold-wurzel, with a little care, just before and after lambing. We cannot economize straw as food so much as we should like, as we require so much litter—at the same time we are not very partial to its extensive use, unless roots and other feeding stuffs can be given with it."

Mr. Clare Sewell Read, M.P., is another of those who preferred contending with the difficulty to yielding at discretion—feeding his flock at unusual cost to giving them away :—

"As I am lumbered up with a lot of sheep that I can hardly give away, much less sell, I have already commenced keeping them in yards in lieu of bullocks. They will go out every day for a run on the pastures, or for a bite of what few roots and green crop there may be, and to keep their feet right; and will be fed in the yards with chaff, cake (half linseed and half rape), acorns, corn, and pollard. I fill my barns with chaff-cutting, $\frac{3}{4}$ths oat-straw and the rest hay, well treading it together and salting the whole mass. The chaff wonderfully softens and sweetens by this treatment, and even young sheep eat it readily. I shall not be able to graze a bullock after Christmas, but must buy in 40 or 50 young steers for the few marshes I have; and they will be fed on straw, chaff, and cake. I have about 15 acres of mangolds that may produce half the usual weight, and these are all the roots I have that are worth removing from the land. These will be pulped and given to the stock that need them most, care being taken to reserve a few for the ewes and lambs in the spring."

Mr. Paget, of Ruddington Grange, Nottingham, says :—

"The hay remaining from the great crop of 1867, added to the two-thirds of a crop of this year, and the excellent quality of the straw, removes anxiety as to the supply of dry fodder.

"The weight of the straw was large, and we cut it for bedding, which economises its use. Mangold being an average crop, and cabbage 25 tons to the acre (two-thirds of a crop), and the common turnips being about half the value of a crop of swedes, I do not very much fear the winter, and I have my usual quantity of stock. Feeding cakes being so dear I have purchased a quantity of very good wheat at 11*l.* 5*s.* per ton on which I know that cattle will feed and milk as well as on any other food."

Mr. John Wallis, Farm Bailiff to his Grace the Duke of Manchester, of Kimbolton Castle, sends the following report :—

"To sell sheep at present prices is ruinous, to winter them is not much better. The following is what I have done and what I intend to do:—In the first place, as soon as I had any corn thrashed, which was in the first week in August, I tied up all our fatting stock and fed them with chaff of straw, together with about $\frac{1}{8}$th part hay, giving them 8 lbs. a-piece of wheat, winter beans, maize, and Hope's cattle food, all coarsely ground together (considering the mixture cheaper than oil-cake at the present prices), and I have just begun to sell them fat. I am now steaming the chaff since we have been cutting wheat straw, all of which we shall use for fodder, gathering the leaves in the park for litter. My store stock I am getting into straw-yards, giving them about 4 lbs. a head of oil-cake per diem with their consumption of straw. The ewes will winter on the grass with hay and peas-straw. Our feeding sheep are now eating mustard with hay and corn. When they have finished I intend putting them thinly on the grass and feeding more liberally.

"The lambs I shall take up and place near the yard, and shall feed them with a very small portion of wurzel pulped and mixed with a large proportion of chaff, and some bran, corn, or cake. A few years ago I wintered successfully 200 lambs with 3 acres of wurzel on the same plan. I lay great stress on pulped roots, if but few, mixed with cut chaff one day to eat the next."

Mr. J. J. Rowley, of Derbyshire, who has been quoted before, also sends an answer to my question:—

"My sheep are on grass; and it appears that, to eke out the scanty crop of turnips, it is better to draw them from the land (on which they are usually eaten) and give them a few daily on the grass pastures, or old clovers. Hay stacks are becoming 'smaller by degrees,' and oat stacks are small to begin with. Still sheep must have food, and where the above are available there can be no better or cheaper plan than chopping them up together. And if to this mixture is added some malt-dust, bran-cake powder, or meal of any kind, the mixture will be much improved. *Fortunately*, in one sense, the maltsters won't buy our barley; so that we are obliged to give it to our sheep, and in the absence of turnips they are doing as well as we can expect. But this is a heavy loss, and shows how completely the agriculturist is at the mercy of the weather."

Here, again, is a case in which a good wurzel crop came to the rescue of the failing turnip crop. Captain Dashwood, of Kirtlington, Oxon, says:—

"I am now carrying about my usual head of stock, namely, upwards of 1100 sheep, 90 cattle, and 200 pigs, besides the working horses; and notwithstanding my good crop of mangold-wurzels, having but few swedes, I must economize my roots. The store cattle and the ewe stock will have them sparingly, and my cart-horses and pigs cannot be allowed any mangold. My forwardest tegs (Oxfordshire Downs) are now on swedes, and will be fit for market at Christmas—thus saving my food. In the management of my ewe stock for the last few years I have much economized both roots and hay. After the mangold crop is harvested the ewes are penned at night over the mangold land and pick up the leaves. Barley-straw (uncut) is placed in the racks, and in the morning rape-cake is given before going out on the pasture for exercise. After the mangold land is folded off a few mangolds are thrown down on the stubbles where they are then penned at night. This season my ewes will be penned on swedes for only a fortnight, 'with hay given for only a week,' before the lambing commences; generally they are on swedes a month or six weeks, with the hay for the last week, before the lambing season."

Mr. John Coleman, of Park Nook, Derby, reports, among other things, on the value of brewers' grains :—

"Our cattle will have hay and straw chopped up together and mixed with grains, large quantities of which are fetched from Burton-on-Trent by our farmers at 6*d.* per bushel, and found by them to be cheaper than anything else this season, on account of the quantity there is for the money. It is not a question with many of making up the deficiency in the root crop, but of finding a substitute wholly for it, as on many farms not a root is to be seen. Straw, also, is so short, that I do not know where the quantity of stuff required for cattle food is to be found. In this district we have much grass land, and with this open weather, and the fact of the land having produced so little in the summer, stock are now living almost entirely upon the land, with but little assistance. Sheep, from the failure of roots, will be much more difficult to keep than cattle. Some years ago I wintered 200 hoggets upon arable land without any turnips, and managed to keep them alive, but I should be very sorry to repeat the experiment. The straw must all be consumed, and it wants reducing to a pulp, as chaff is not fine enough or digestible enough for stock to take in such large quantities as will have to be given this season; and when large quantities of straw are used boiled linseed, or other things that are not of an astringent nature, should be used, or young stock particularly will suffer."

According to Mr. Henry Hudson, of Pershore, the difficulties of a scanty winter's supply of food are to be met :—

"First by having horse-power to the chaff-machine, and keeping it daily in work with an intelligent careful man in care of it; cutting up as many varieties of fodder as possible, viz., hay, clover, pea-straw, vetch straw, wheat-straw—mixing a certain portion of wheat-chaff daily with the chop. Then by pulping mangold or swede roots, and mixing a certain portion of them over night with the chaff so as thoroughly to blend the food: thereafter by mixing wheat, beans, peas, and tail barley, grinding the mixture and putting a certain portion of the meal with the chaff at feeding-time. All this must be given *regularly*, for nothing injures stock so much as irregular feeding, whether as regards the time or food. I prefer the pulpers to be worked by hand rather than to be driven by horse-power, as we can then use them in different parts of the farm, which is more convenient and a great saving of haulage. Most farmers have two or three additional wheat ricks this year, and one of them must be devoted to the stock on the farm; nothing is cheaper and nothing is so good for stock, young or old.

"All this may appear to be a troublesome and expensive process, but it is nothing of the kind; for well-trained youths, under proper supervision, will pulp the roots, mix the chaff with the roots, and put the whole handy for a more experienced person to feed the stock. The cutting of chaff and pulping roots will be of more advantage than anything else that I can recommend,—and with attention to these matters I think we may get through the winter months far better than we expected. I have not yet alluded to the cutting up of a certain portion of wheat and barley straw. The wheat straw of this season is so good that the cattle will eat it without any other mixture, therefore it may be used more plentifully than usual, and the early harvested barley-straw is of immense value mixed with other fodder. Both feeding and store tegs will do better by eating the stubble turnips and other turnips on the land with plenty of chaff and corn kibbled until they are all gone; and then, of course, they will be put to pulped mangold or swedes with kibbled corn. The working horses and young colts we are keeping almost entirely on chaff with

bran and a little meal. The pigs are getting steamed potatoes with the mixed meal; and the poultry are daily fed on the same mixture."

Mr. Charles Howard, of Biddenham, is another witness to the exceptional value of the straw this year:—

"It must be remembered that the straw this season is quite as good, or better, than meadow hay is some years. The cattle consume the straw, chaff, and cavings most readily. I am using very little hay. The straw-chaff is cut short, damped and mixed with bran, palm nut meal, a little of friend Thorley's cake being added as required. Upon this I am glad to say my herd is looking well. The season, too, is helping us very much; it is all that can be desired. I know some who have scarcely any animals in the yards as yet, they are still [December] on the grasses."

The following is from Mr. Savidge, of Sarsden, on the same subject:—

"Perhaps in no season did the cattle consume the straw more greedily, particularly the straw of wheat. I am using one bushel of grated mangold mixed with finely cut chaff to every four beasts per day, with a liberal supply of rape and cotton cake; the animals have also a little whole straw to browse over before it is used for bedding. If you can afford hay, it is no matter how you prepare it; but if straw only is used, by all means cut it as fine as possible: it would pay to have it sifted. I must conclude by stating I use and prefer good linseed cake for all young stock."

After Mr. Savidge, the testimony of Mr. Dods, of Anick Grange, near Hexham, may be quoted, for he, on the other hand, speaks highly of Rubsen* cake. The turnip crop has not been the utter failure in the north that it has proved farther south; and Mr. Dods, therefore, can give what we should consider a liberal allowance of roots to his cattle:—

"For my feeding cattle I hope to have five stones of turnips per head per diem, which with straw *ad libitum*, and 6 lbs. of Rubsen cake, and when finishing a few lbs. of linseed cake should fatten them. The 'Rubsen' has been benefited by the hot summer, and is of so good a quality (where pure) that the cattle are eating it greedily. I don't believe in cooking; I tried it for several years, but have long ago given it up, and now give all food raw, and am satisfied the cattle do better at less cost. My cows, however, receiving straw *ad libitum*, get 3 lbs. of Rubsen in the morning, go out on fine days for a few hours, and in the evening have a warm mash of chaff and 3 lbs. of meal from light corn and Rubsen cake, with boiling water poured over it. For cows milking, I believe the warm mashes a benefit. My store cattle have straw and 3 lbs. of Rubsen cake, on which they do well; indeed, even when I have abundance of turnip I never give my store cattle any, as they do much better on the Rubsen cake alone. My feeding hoggets are at present folded on turnips, in the usual way, with ½ lb. of linseed cake each. Next week I shall put them on cut turnips, limiting their supply, and continuing the cake to them, with a rack full of cut straw in the field. They will get as many turnips as they can eat in the forenoon, and their cake at afternoon. My ewe hoggets will have the same turnips and a little (¼ lb.) of Rubsen cake. My breeding ewes will go on the old grass fields, and have ¼ lb. cotton

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* Rubsen is the German name for rape or coleseed.

and ¼ lb. Rubsen cake, if the latter is to be had; if not, they shall have a little more cotton-cake, and a smaller allowance of linseed-cake instead of the Rubsen, which is in such demand that it can scarcely be had even at 8*l.* per ton."

Mr. Bowly, of Siddington, near Cirencester, who has this winter a larger stock upon his farm than ever it has carried before—as he intends having a sale of short-horns in April—reports as follows:—

"Our mangolds were as good as usual; swedes almost total failure, from grub; turnips very inferior; the best are those planted the latest after the land was sufficiently saturated; those that were planted during the partial rains in July, did not come up till after harvest, and are not good, from the seed remaining so long in the ground.—I cut all my fodder into chaff, mixing half barley-straw with the hay; and animals in a store state do well on this, with the addition of from one to two bushels of brewers' grains weekly. The straw is very good this season, and the stock are doing well on this food. To younger animals (under a year old) I add oilcake, or meal composed of barley, oats, peas, and Indian corn. I like a mixture of this kind, and give, say a quarter of a peck of meal, and 1 to 2 lbs. of cake to each animal daily. My animals over a year old, and not milking, do well on straw chaff alone with the grains. This season will lead to cabbages being grown more extensively. I had only about two acres of the small cabbages, and it was an immense help. If I had planted ten acres I should have been independent of the season; the produce is wonderful."

Mr. Clarke, of Long Sutton, gives the following report of this winter's plans on his farm:—

"We shall first consume our young green crop. My sheep are now eating the late sown white mustard and rye crops. The few mangolds we have are already (Oct. 21) secured for the ewes at spring. Turnips will remain as long as possible untouched; in the meantime we shall resort to several expedients to tide through the winter. We have abundance of good wheat straw, a moderate supply of good oat, pea, and bean straw, a large stack of well-got clover, and a little hay. The lambs (about 200) will be located in a well sheltered grass field. We purpose supplying them in troughs, with chaff *ad libitum* cut from wheat straw and pea straw, with a little bean straw for them to pull at through a double row of sheep trays. Their artificial ration will consist of one-third of a pint of Indian corn meal for a time, to be increased to half-a-pint, and as judgment dictates as being required, ¼ lb. of linseed-cake in addition daily. As change of food is often desirable, oats, barley, malt combs, and bran will be used. We have happily a large crop of potatoes, very many being diseased. We shall try to induce the lambs to eat these potatoes, either cooked or uncooked. The older sheep and ewes will remain in their grass pastures, and be supplied with chaff as above in moderation, and meal or cake; and the ewes will have, in addition, the mangold before and during the lambing season. In wintering the cattle we shall depend much upon the straw of wheat, peas, and beans given to them in the hovels or fold yards, together with moderate rations of linseed cake daily, varying from four to eight pounds each. The milch cows will have in addition a few cabbages daily amongst them, as we have fortunately secured an acre or two. Should our potatoes prove much diseased, they will be appropriated to cattle feed. The cart horses and nags will appropriate the clover, which is being cut up with a few oats in the straw, aided by a little steeped Indian corn, daily. Our pigs we purpose fatting upon diseased potatoes cooked, and Indian corn meal, or

steeped Indian corn. Store pigs we shall keep upon steeped Indian corn, diseased potatoes, swill, &c., &c. It was in this way we succeeded in successfully bringing our stock through the winter of 1864-5, when the summer drought and attacks of grub destroyed our green crops. Indian corn is this year plentiful, and will be in a great measure substituted for the oats or meal of 1864-5. We hope to be equally successful in this untoward season."

Mr. Williams, of Baydon, says:—

"The chaff-cutter is being generally used, and we get a beautiful sack of chaff, with one-third hay, mixed with peas' haulm, oat and barley straw, wheat cavings, and some wheat straw, all very sweet; and the sheep and cattle are doing well with it, with what they can get in the stubble fields that have not been ploughed: they must soon go to the straw-yard, where with plenty of good water, a greater quantity of chaff must be given, together with some meal or sprouted corn. Wheat, with the price any further reduced, will be the cheapest article to give according to weight, and this, if sprouted, will keep them in good condition; but other corn no doubt will be given, and cake; and the Chancellor of the Exchequer will not be able to prevent us this year from giving malt, for in the West of England the barley that was cut when the rain came was all malt in 48 hours, and the greater part that was standing is more or less sprouted. I intend keeping what roots I have till the spring, as there is no doubt that they will be of more value after lambing time than now."

Among other correspondents on this subject is Mr. A. S. Ruston, of Chatteris, who, however, does not keep a breeding flock, and therefore buys lean sheep to graze just as he has need. He usually winters from 400 to 500 sheep in yards, as manure manufacturers; this year he has food for only 150, and has been therefore obliged to procure a larger number of cattle to keep on straw and linseed and cotton-seed cakes.—Mr. Evershed, who has been a contributor to this 'Journal' on this very subject, refers to his paper on 'Maintaining Sheep on Dry Food,' in the first volume of the New Series.—Mr. Burnet, agent to Colonel Kingscote, must also be quoted. He has cut up the barley and oat-straw with a third of their quantity of hay, and he mixes one day's food the day before using it with 6 lbs. of beans for each animal, throwing a few buckets of water over it. The store stock get as much of this as they like to eat, and are doing as well as when on grass.

This is the one reference throughout our correspondence to that system of cooking by fermentation to which the agricultural journals drew a good deal of attention some years ago. The cost and labour of steaming food will probably be a hindrance to its adoption except where a very large number of live stock are being fed; but it seems not unlikely that the heating of moistened heaps of chaff and other food may be so far an efficient cooking as to ensure at least that the poorer portions of the mixture shall be sufficiently penetrated by the more sapid and nutritive parts so as to make the whole a palatable food. An occasional year of scarcity may be useful if it teach us the useful lesson of

economy, which, while a necessity now, may be a profit hereafter. The use of the chaff-cutter and pulper, and the more general consumption of straw as chaff soaked with root-pulp, or (failing that) with water hot or cold, and mixed with a sufficiency of meal or cake to make it at once palatable and feeding, is a practice to which the drought of 1868 has driven many who will continue it long after the immediate necessity has passed.

In the following report, kept till the last as one of the best contributions to this correspondence, it will be seen that all the subjects are discussed to which the attention of the reader has been directed. Mr. Samuel Jonas, of Chrishall Grange, to whom we owe it, speaks with confidence of the deep cultivation even of light and chalky soils when accompanied by high farming. He refers to the alterations of cropping, which the drought has suggested and will necessitate. And he especially refers to the serviceableness of the chaff-cutter, and to the advantage which, not alone in years of scarcity, but every year in his district, is derived from the practice of cutting all clean straw to chaff at times of thrashing, storing it in bulk well trod down and salted, to be dug or quarried out as wanted during the ensuing season. The following is Mr. Jonas's valuable letter:—

"The farm I now occupy consists of 850 acres, about 15 acres of which are grass. The soil is on the chalk formation, which crops out on about half the farm; the rest consists of weak, light gravel and sandy soil, none of which requires draining. My sons' farms, which are adjoining mine—900 acres, 700 acres, another 700 acres, and 1000 acres respectively—are of the same description of soil, none of which requires draining; and this prevents me from answering your first question. We are all advocates of deep ploughing; our first earth is with three horses, and ploughed from 10 to 12 inches deep. I myself do not believe it possible to cultivate too deep, if accompanied with high farming. By this plan I have increased the staple on one farm now held by my son from 3 and 4 inches to 10 and 12 inches, and the crops in the same ratio.

"Steam cultivation we have only done on a small scale the last two years. Wheat was last year a full average crop on the chalk, barely average on sand and gravel. Barley has been a very light crop throughout the district, and peas and beans bad. But in regard to green crops I never knew them so bad. There are no early turnips or swedes—all our roots are grown since the rains after harvest, and I fear will scarcely have any bulbs.

"We have ploughed up a large portion of our wheat stubbles, which we were enabled to do, being as clean as possible. This land we have sown some with Sutton's six-weeks white turnips for spring feed, some with rape for ditto, and some with mustard for feeding off this autumn; all with 3 cwt. root manure. We have also sown a large breadth of rye and tares for spring feed.

"I fear our greatest calamity will be the failure of our next year's clover, on some of which we have drilled trifolium, and on some half a bushel of trefoil, and over these red clover with Italian rye-grass, and this has planted the best and is most likely to succeed, although I do not like it as a preparation for wheat. I did not leave my old clovers, so that what I have done will not interfere with my system, which is the four-course. I fear we shall have to plough up in the spring all our bad planted seed land and

sow with peas for a crop, and tares for feed, the rest to be sown with early rape fed off again; the rape being fed off for wheat.

"In addition to the preparation I have made by sowing rape, turnips, and mustard on my next year's fallows, I have the great satisfaction of having three barns, instead of being full of corn, filled with straw chaff well salted and fermented, which smells as sweet as hay. I believe I have the produce of straw cut into chaff off about 150 acres of wheat, oats, and barley, and this enables me to use corn, cake, bran, and malt-combs for feeding to a much larger extent—and thus supply the manure lost by failure of root crops.

"As to cattle in yards—with the prospect, through the folly of Parliament, of a repetition of that frightful plague, the cattle murrain, I had decided not to winter any this year; but I have been foolish enough to run the risk, and I am now feeding beasts in my boxes and yards by boiling the cake and meal, which I grind with my American mill. I have two coppers hung in my mixing place; we put the meal and cake-meal into these coppers, and boil them well, keeping the whole constantly well stirred. Near the coppers are two boarded bins, which are filled with my old chaff; the boiled mixture is poured on the chaff, which is well stirred over and well mixed up. The beasts are fed with it in a milk-warm state, and are doing well with it; they will not have a root to eat. Yet I shall thus be able to make them good fat beasts. Some neighbours of mine, until prevented by the Excise, germinated both wheat and barley, feeding both sheep and cattle on this undried malt, and in this state it may be given in unlimited quantity, and fatten at a far less cost than that of any other kind of food.

"Much is said about the farmer's friends; surely if such a class existed in Parliament, we should no longer be subject to such injustice and oppression as not to be permitted to use the produce of our farms in that state which alone will give us this advantage. Surely the government will yet be induced to grant us the liberty of germinating corn for feeding purposes, which could be done without any loss to the revenue.—I consider the storing and fermenting straw chaff to be invaluable. I believe we do it in this locality to an extent unequalled elsewhere. It is done by us at little expense. Our engines are from 10 to 12-horse power: and by the aid of a rigger attached to our thrashing machine, which drives one of Maynard's chaff-cutters, we cut the straw as fast as it is thrashed. I can do this at from 4*d.* to 6*d.* per acre (*see* 'Journal Royal Agricultural Society of England,' vol. xxi. p. 172). It will this year be the salvation of our herds and flocks."

With this valuable report from Mr. Jonas I conclude.—I have not thought it worth while to quote the reports of correspondents on the value of acorns, horse chesnuts, tree leaves, gorse, &c., as contributions to the food store of the season. The wholesomeness and usefulness of gorse, when crushed as food for sheep and cattle, is unquestionable. Acorns, too, crushed or ground, and given with other food, have helped to eke out the more costly supplies of meal in mixtures with roots and fodder. Mr. J. J. Rowley, referring to the practice of Mr. John Woods, the Duke of Portland's agent, says, that after being passed through a close linseed-cake mill, they were given to sheep with advantage, at the rate of ¼ lb. a-piece daily, along with cut hay and chaff, and other dry food. And "a Suffolk farmer," writing to the 'Times,' in October last, said that he was then giving forty-two

score of sheep one pint of acorns a-piece daily, with ½ lb. of cake, chaff, and a few turnips; and, paying women and children 6*d*. per bushel for collecting them, he expected them to collect more than 200 sacks, besides sending twenty-five score of ewes round the outside of the farm to help themselves. These were folded at night on a field of beet-tops, and were doing well. He considered one pint of acorns equal to a quarter of a pound of cake. On the other hand, whether from acorns or horse chesnuts —almost certainly from one or other—there was last autumn a great deal of fatal illness among cattle grazing in the fields, especially in the county of Kent, but also in the Hertfordshire, Warwickshire, and other wooded districts. And this the veterinary authorities attributed to the consumption of excessive quantities of so indigestible a food.

It is plain, however, that it is not of such petty and merely local economies as that of acorn-picking that the past season chiefly speaks. Its leading lessons, as represented in the letters quoted, are (1) the policy and need of ample liberty of cultivation being given to the cultivator; (2) the importance, by deep drainage and deep tillage, of having in the soil and subsoil a deep and well furnished storehouse of food for plants always ready against a time of drought; (3) the serviceableness (against a like contingency) of seed-beds full of plants, especially cabbage and kohl rabi plants, which may be transplanted if other crops shall fail; (4) the rapid growth of white mustard, stubble turnips, rape, Italian rye-grass, rye, and other useful leaf crops, in the autumn, when once the hardened cultivated stubble has been moistened to receive the seed; (5) the independence (thanks to manufactured fertilizers), alike of the soil and of the farmer, as regards the rotation-rules on which good agriculture used formerly to be supposed to hinge; and (6) the serviceableness, for economising food, of all those machines which enable us to divide and mix—the chaff-machine, the pulper, and the grinding-mill—and thus, by a small quantity of roots and meal, to render nutritive and palatable a large quantity of comparatively innutritious but yet useful fodder.

If, in place of seeking to be taught on all these points by the collected and concentrated reports of many during an exceptional season, any one shall prefer the lesson of prolonged experience on one well-managed farm, I commend to his attention the following report by Mr. Randell, of Chadbury, near Evesham. I have presumed to append it entire to this collection of notes upon the drought of 1868 as a capital illustration of the advantages at once of deep and thorough tillage, and of crop-cultivation with especial regard to stock-keeping on a farm where formerly little or none were kept; and also of that advantage

to landlord as well as tenant which arises wherever a good farmer has free scope and liberty, as Mr. Savidge puts it, "to do the best he can."

"DEAR SIR, "Chadbury, near Evesham, Nov. 13th, 1868.

"Your request that I will describe my farm before answering the questions of your circular as to the effects of the drought of the past season and the proceedings consequent thereupon, seems to involve the necessity for some detail as to the changes which cultivation has made upon the farm since I entered upon it in the year 1839; the increased stock, more especially of sheep, which those changes have enabled me to keep, and consequently the extent to which the drought of this year has affected me.

"The farm consists of 490 acres, about 90 of which are in pasture and meadow, the remainder being arable, divided thus:—

"100 acres of mixed gravelly soil, fair turnip-land.

"180 acres of heavy clay-land of ordinary quality.

"120 acres of very poor clay.

"At the time I entered upon it it was in a very bad condition. All my agricultural friends cautioned me as to the disastrous consequences which would follow my attempts to improve it, and the offgoing tenant and the old labourers alike assured me that, as to the 120-acre portion, 'it never did grow a crop, and never would;' in fact, nearly all the land of this description had been entirely uncultivated for several years.

"Obviously, the first thing to be done was the draining of the clay-land; next, the removal of unnecessary fences and *all* hedgerow timber from the arable land. My excellent landlord, Mr. Holland, allowed pipes for the former, and gave his unqualified consent to the latter. Finding limestone under one of the fields, I proceeded to burn and apply it to the fallows for roots, and after vetches; but before the expiration of my second year I came to the conclusion that it would be cheaper and more beneficial to burn clay than stone; so I commenced the process of land burning and burning clay in large heaps from the old hedgerows and banks described in a letter which appeared in the fifth volume of the 'Royal Agricultural Society's Journal.' The effect of this treatment was that in the fifth year my flock of ewes had increased from 90—the number on the farm when I entered—to 300, and my growth of wheat from about 225 quarters in each of the two first years to 1000 quarters. But, notwithstanding the influence of draining and burning in rendering it comparatively easy to produce roots

upon the clay-land, clay it still remained; and those roots could not be consumed where grown without injury to the succeeding corn-crop. I therefore resorted to shed and yard feeding of sheep; and my practice then settled down to growing rape and early turnips on part of the clay-land, to be eaten off in October; turnips and swedes upon the lighter land to serve till Christmas; and then mangolds in the yards till the end of April. In this process we use burnt soil in the sheds 18 inches to 2 feet deep, turned over by degrees as it becomes saturated with urine and dung. This serves a double purpose,—preserving the feet of the sheep, and making a very valuable addition to artificial manure applied to the next root-crops. Let me say, however, that it is a mistake to suppose—as I have often heard—that sheep *will* have footrot if kept on straw. I frequently winter the ewe tegs without the aid of burnt soil, and never have lameness. All that is required to guard against it is that the pens be littered daily, but only just so much as is necessary. In this way the manure is so consolidated by the treading that no fermentation goes on, and the cause of footrot in yards is avoided. There will be no shed-feeding this winter. Rape and young turnips must be eaten where grown.

"I occupy now 250 acres in addition to this farm, all grass land except 30 acres, and mainly used for dairy cows and young cattle; folding over during the winter, with ewes eating chaff, the portion of land which has been mown or grazed by dairy cows during the previous summer. Since occupying this additional land my flock of ewes has increased to 400; but the food-supply for them almost entirely (except during the months of December and January, when they are employed as above in counteracting the effect of mowing and dairy farming) is grown upon this farm. To show how this is done, I must give my usual cropping in detail:—

"Wheat, 200 acres.

"Winter beans, 20 acres.

"Clover for mowing, 20 acres.

"Mixed seeds to graze, 60 acres; half of which is broken up in July for rape.

"Fallow, with green crops, 100 acres.

"The fallow cropping will be in this way:—

"30 acres of the poor clay-land will be part vetches, part Italian rye-grass, to be eaten off by the end of June; the land fallowed and prepared for wheat by steam, having grown no other green crop.

"25 acres of mangolds, manured after harvest; steam-ploughed and planted on stale furrow.

"25 acres of cabbages of different kinds, to be ready in succession, planted upon wheat-stubble well manured in the autumn, eaten off in May, June, and July, and planted with swedes, turnips, and rape.

"15 acres of winter oats and vetches, eaten off early by ewes and lambs and ewe tegs, and planted with swedes and turnips.

"5 acres of late cabbages, to be eaten off in August and left for wheat.

"In this way the fallow quarter provides a succession of food which, with the mixed seeds and an occasional but by no means frequent change to a grass field (for the grass land does very little more than provide hay and carry the dairy stock and young cattle), carries the ewe tegs, ewes, and lambs through the summer, and produces sufficient roots to winter the lambs. The wether lambs are sold fat at the end of April or early in May; 50 or 60 yearling rams are kept, after finishing the mangolds, on cabbages till September. This process has been uninterrupted—except 1864—for several years. But I must depart from the order in which your questions stand to follow out the subject of cropping, and show how the drought of this year has affected me and how I have provided for carrying my sheep through the approaching winter.

"In the first place—and for the first time since I have tried to grow them—my mangolds, except about 2 acres, entirely failed. The field intended for them is naturally a poor piece of clay, subject to an unconquerable weed which only clay-land farmers know anything about—wild onions. A manuring of 30 loads per acre in the autumn of 1867, coupled with a rather deep steam-ploughing and a very mild winter, brought up such a crop of these weeds that scarifying only, previous to planting the mangolds, was out of the question. It was, therefore, twice moved with Smith's steam-cultivator as deep as it had been ploughed, in order to get under the onions. The land was thus left rough; it dried through; we effectually got rid of that crop of onions, but no mangolds vegetated. It was subsequently scarified and drilled with turnips, but to no purpose; afterwards with rape, which lay in the ground till we had rain early in August. In the same way 70 acres of swedes, turnips, and rape also failed; and at the end of July I found myself with upwards of 1000 sheep and lambs, and nothing for them but 5 acres of drumhead cabbages, stunted by the dry weather, and 2 acres of mangolds.

"Harvest was finished on the last day of July; during the previous week I had scarified 22 acres of winter-bean stubble, and worked down 11 acres of the poor clay fallow after vetches,

to sow both with white mustard, giving the latter piece 2 cwts. of guano per acre. I also manured, steam-ploughed, and planted with rape 13 acres of wheat stubble; this latter 46 acres being in addition to the ordinary area of green-crops. I had on the 6th of August, waiting for rain,

33 Acres of Mustard,
50 Acres of Rape,
50 Acres of Turnips.

The rain came, and from the healthy state of the land after the excessive drought—the clay-land more especially—the growth of all was very luxuriant. By the middle of September the mustard required more sheep to eat it than I had; and I gave two of my neighbours as much as they would send sheep and hurdles for. By the middle of October the rape was ready, and will carry the lambs nearly to Christmas; and the turnips, if not destroyed by frost—and young turnips, protected by luxuriant tops, are not often destroyed—will serve the remainder of the winter; the little lot of mangolds, pulped and economically used, holding on till the early cabbages are ready.

"You will perhaps ask how, with only 5 acres of cabbages, more than 1000 sheep were maintained from July to the middle of September. The draft ewes were sold early in September; the store ewes and theaves lay upon the bare and burnt-up seeds, a poor grass-hill, and the corn stubbles, and lived upon wheat-chaff, bran, and cotton-cake, costing not quite 3*d.* per head per week. The ewe-lambs were put upon a meadow which had been mown; it was entirely burnt up, and they were kept on clover-chaff, bran, malt-dust, cotton cake, and linseed cake. The ram and wether lambs went to the cabbages, getting only half the usual allowance and a mixture of dry food, as the ewe-lambs. In a month, however, we could see that the cabbages would suffice for all the lambs until the mustard was ready, and the ewe-lambs also were then put to them. By this time we had learnt—and this is a lesson we shall continue to act upon—that the lambs were doing better on a smaller quantity of cabbages and more dry food than they formerly did with as much cabbages as they could eat.

"As it was important, with a view to the next wheat-crop, that all the mustard and the rape where mangolds should have been, should be eaten off in good time, we kept store ewes and the lambs on those fields till finished. All is now (Nov. 11th) ploughed, and part planted with wheat.

"The ewes are now upon the grass land, and only the lambs (520) upon rape. At first we lost several (not uncommon upon young rape) so we bled the whole lot and reduced their allowance

of purchased food. They have now no cake, the mixture being for the lot daily :—

	s.	d.
1 cwt. Bran, costing	6	3
1 cwt. Malt-dust	5	3
½ cwt. "Ground-nut Meal"	4	1½

with 30 bushels clover-chaff and 30 bushels of wheat-chaff, given two-thirds in the morning and one-third at night.

"This 'ground-nut' meal is a new article of food. What its feeding properties are, we do not yet know ; it is certain, however, that stock of all kinds are fond of it, that it increases milk, and that it induces sheep to eat wheat-chaff most kindly. Messrs. Burlingham and Co., Evesham, are agents here for the crushers in Liverpool, and will answer any inquiries you make about it.

"Thus I hope to get my sheep stock through the winter. For spring and summer food—clover and mixed seeds having entirely failed—the 81 acres sown therewith have been planted with

Cabbages	10	Acres.
Trifolium	33	„
Italian Rye-grass	30	„
Rye to feed off	8	„

My difficulty will be with ewes and lambs at first, the provision for them coming on in the following order :—

8	Acres	Rye	while lambing.
6	„	Rape grown on wheat stubble ..	while lambing.
16	„	Winter Oats.	
30	„	Rye-grass.	

These crops, with about 100 acres of the grass land, must carry them till the trifolium is fit to fold off, of which we shall probably want about 10 or 12 acres, leaving the remainder to be partly mown for fodder and partly given to working horses until the vetches are ready for them. By the end of May, we shall wean the lambs to cabbages, and then all anxiety about them is over. I have 30 acres planted this year, and I have 7 acres more to plant in the spring.

"The cow stock—97 Short-horns of all ages—will be kept mainly on straw with one feed a-day of a mixture of cut-chaff, wheat-chaff, bran, and 'ground-nut' meal ; reserving the hay for the dairy cows and heifers (45) after calving. The horses will have cut-straw and wheat-chaff and 'roughings' (cavings), with bran, Indian corn, and beans. The season does not affect the feeding of horses or cattle. We have abundance of straw.

"The only change as to the corn-crops will be that, instead of half the arable land being wheat, about 30 acres after turnips last eaten will be barley, and only 170 wheat.

"The dry season of 1864, when everything in the shape of green food for winter, except mangolds and cabbages failed, taught us that sheep would do better upon mangolds pulped and mixed with a large proportion of dry food (clover and wheat chaff) than they had before done with mangolds sliced, and we have acted upon that lesson since. This year has convinced us that lambs at cabbages do better the more dry food they are induced to eat; also that, after an early harvest upon light land, a crop of rape may be grown upon wheat stubble, and eaten off in time to plant cabbages in October. The land having been manured for the rape, is ready for the cabbages.

"I have answered, probably at greater length than you will consider necessary, the three last questions of your Circular. My replies to the other three shall be more brief:—

"*Land Drainage.*—Probably there never was a season in which so little difference was observable between drained and undrained lands. The land really could hardly be said to be wet during the winter of 1867-8. If the previous autumn and winter had been otherwise, and the dry summer of 1868 had followed a season of ordinary character, every farmer of clay land knows perfectly well that the undrained fields would have cracked in all directions, and the wetter the land had been during the winter the sooner would it have suffered from the drought of summer, whether in tillage or grass. I must go back some years to give you an instance. I have a meadow, 36 acres, very flat, naturally very difficult to drain. My predecessor told me that 'the grass never began to grow there till Pershore Fair (June 26th).' The reason was obvious: it was often flooded, and neither floods nor rains could do more than get off the surface until evaporated by the summer heat. The land was starved by stagnant moisture until the summer was half gone, and then it cracked and burned. It is now drained and embanked to make the floods manageable, and, though not a good meadow, is very much improved. It produced more than a ton per acre this year, cut the middle of June.

"*Steam-Cultivation.*—I adopted steam-cultivation in 1857. I cannot give any positive proof that the land has suffered more or less this year by reason of deep cultivation; but it can scarcely be doubted that an additional depth of cultivated soil must enable plants better to withstand drought. It is quite certain that the drainage is more effective since the adoption of steam-cultivation, and this alone is proof that drought is less injurious; for, as I have said before, all know who farm it, that undrained or imperfectly drained clay-land suffers more from dry seasons, as well as wet ones, than land which has been effectually drained. My work by steam this season has been:—

"20 acres steam-cultivated twice for mangolds.

"25 acres of clay land, after Italian rye-grass, broken up by Smith's cultivator; afterwards ploughed with Fowler's plough for rape and turnips.

"17 acres of lighter land, Italian rye-grass, broken up by Smith's cultivator, and afterwards crossed for swedes, failed; now turnips—my best crop.

"23 acres of clay, after vetches; first cultivated, then ploughed.

"23 acres after cabbages, first cultivated, then ploughed; 15 acres now turnips and rape.

"30 acres of poor clay, after mixed seeds in July; worked with Fowler's plough for wheat.

"21 acres, clover, in September; ploughed with Fowler's plough for wheat.

"103 acres of wheat stubble, ploughed, and 23 acres of ditto, cultivated, for winter beans, cabbages, vetches, rape, winter oats, rye, and mangolds (1869).

"23 acres ploughed after mustard for wheat.

"That is, altogether, 200 acres once ploughed or cultivated, and 108 acres twice.

"Assuredly there could not be a finer season for steam-cultivation than this has been, and all crops upon clay-land in 1869 will be benefited by the healthy state in which the drought of 1868 has left it.

"*Harvest of* 1868.—The wheat upon all clay soils is now known to be very good; in this district the marls, sands, and gravels, are below an average, the crops having ripened prematurely. This applies to barley also. Winter beans are good; spring beans, very bad; peas, an average crop; of green crops I have said enough.

"Pray make any use you please of any of these somewhat hastily written notes, and

"Believe me, very truly yours,

"C. RANDELL.

"*J. C. Morton, Esq.*"

III.—*Field-Experiments on Clover-seeds and Permanent Pasture.* By Dr. AUGUSTUS VOELCKER.

IN Vol. II. s. s., Part 2, I gave a short report of field-experiments on clover, that were made in the years 1864 and 1865. Both these years were very dry, and consequently unfavourable for field-experiments with artificial manures. Nevertheless the

results obtained in several trials showed that even in a dry season like that of 1864 the application of potash-salts in conjunction with superphosphate of lime to clover-seeds was attended with considerable benefit on land naturally light in texture, and deficient in available potash—a characteristic constituent of all the better descriptions of agricultural clays and clay-marls. In most cases, however, in which I employed potash-manures, they did not produce the effects which at one time I anticipated they would. As potash is an expensive manuring element, it is of much importance to the agriculturist to be able to determine with some degree of certainty, before he goes to the expense of buying potash-manures, whether money laid out in this way is likely to be a profitable investment. The questions, therefore, naturally suggest themselves, under what circumstances is it advisable to spend money in the purchase of such manures, and upon what soils or for what crops are they altogether useless, or not likely to give a good result in an economical point of view.

Every one who has given attention to agricultural chemistry must be struck with the rapid progress which has been made of late years with regard to our knowledge of the manner in which plants derive nourishment from the soil and the atmosphere. We are at present in a much better position than our forefathers were to explain rationally the fact that some fertilising matters produce a much more marked effect upon vegetation than others: in many instances we can account satisfactorily why a manure, which when applied to one soil has a powerful effect on a particular crop, does not show the same effect upon another; numerous systematic field experiments have taught us when and how to use fertilisers in which ammoniacal salts, or nitrates, or phosphates, are the preponderating or characteristic manurial constituents. Again in many instances the causes of the sterility which characterise some land have been clearly traced to a deficiency of one or more of those soil-constituents, without which our farm-crops cannot grow luxuriantly nor come to perfection; and by supplying the deficiency in the soil of fertilising matters, such as lime, potash, phosphoric acid, &c., the intelligent farmer has succeeded in many instances in transforming all but barren land into useful and fairly productive soils.

Great as has been the progress during the last ten years with regard to the theory and practice of manuring, an extensive field for inquiry is still left open to the man of science as well to the advanced agriculturist; and much pains-taking labour will have to be expended by both before our knowledge of the action of fertilising matters and our practice of manuring become thoroughly satisfactory.

The conditions under which ammonia, lime, or phosphates

act beneficially upon vegetation, are far better understood than those under which nitrates or salts of potash may be applied to the land with advantage. For this reason I instituted during the last five or six years numerous field-experiments, with the special view of affording to the practical farmer the means of judging for himself when he might with advantage employ potash-manures or nitrate of soda.

In 1864 and 1865 my experiments were tried chiefly on light sandy soils, and having found potash efficacious when used in the shape of muriate or sulphate of potash, and still more so when applied to the land in conjunction with superphosphate of lime, I was anxious to ascertain whether the same beneficial effects which resulted from the use of potash-salts and phosphates on light soils would also manifest themselves on clay-land. In 1866 I consequently experimented upon heavy land with precisely the same manures which in previous years had given me a more or less favourable result on sandy soils; but although several sets of experiments were tried in various parts of the country, no benefit whatever resulted from the application of salts of potash on heavy land either to roots or to clover-seeds.

It is useless to record in detail all the failures, or rather negative results, which were obtained with potash-manures on soils containing a considerable proportion of clay. I may, however, mention in particular that, at my suggestion, Mr. Robert Vallentine, of Burcott Lodge, Leighton Buzzard, applied salts of potash upon potatoes, mangolds, swedes, and clover, five years in succession without experiencing the slightest advantage from them, whether they were applied early or late in the season. Some of the experimental-fields at Burcott Lodge farm were decidedly stiff and retentive, in consequence of their containing much clay; others were of a more friable character and poorer in clay; but in neither case did potash do any good. It is evident, therefore, that either these soils contained naturally a sufficient amount of available potash to meet all the requirements of the different crops experimented upon, or that by good management enough potash was restored to the land in the ordinary course of manuring and good farming to render the artificial supply of potash superfluous. This must not be supposed to be an exceptional case, for, as already mentioned, I have not as yet met with a single instance in which potash-salts produced any good effect on arable clay-land.

Field-experiments, in order to be practically useful, should always be tried for a succession of years under as great a variety of conditions as regards soil, time and mode of application, and crops, as possible. It is further desirable to employ the same fertilising substances or their mixtures from year to year, and altogether to deviate as little as possible in succeeding years from

the plan fixed upon in instituting a definite experimental inquiry; for it is impossible otherwise to obtain comparative results and clear indications of the peculiarities of action of the various manuring elements.

In a former paper on field-experiments on clover-seeds, I gave a detailed account of the reasons which induced me to select the manuring matters which I employed in previous experiments, and which I likewise used, with slight variations, in all subsequent field-trials upon clover-seeds. I need not, therefore, refer to the same subject on the present occasion.

The failures which I experienced on heavy land with potash-manures in 1866, induced me to experiment during the last two seasons chiefly on light land, and the object of the present paper is to record the results of experiments on clover-seeds and permanent pasture, which, under my direction, were carried out with praiseworthy zeal by several of my agricultural friends, in whose skill and care in making field-experiments I have every reason to place full confidence.

Field-experiments on Clover-seeds, made in 1867 *at Escrick Park Home Farm, by Messrs. Coleman and Hull.*

The field upon which the following experiments were tried grew barley in the preceding year. The usual mixture of clovers and Italian rye-grass was sown with the barley. The seeds came up well, and the plant was tolerably good and uniform on the piece selected for the experiments. Apparently the selected piece of land was uniform in depth and in its general character. It was divided into eleven equal and adjoining plots of 1-20th of an acre each. The eleven plots were treated as follows, as regards manure:—

Plots.	Name of Manure.	Quantity of Manure per Plot.	Rate per Acre.		
			Tons.	cwts.	lbs.
1	Nitrate of Soda	22½ lbs.	0	4	0
2	Sulphate of Ammonia	22½ ,,	0	4	0
3	Mineral Superphosphate	22½ ,,	0	4	0
4	Common Salt	22½ ,,	0	4	0
5	No Manure	..	..		..
6	Muriate of Potash	22½ ,,	0	4	0
7	Sulphate of Potash	22½ ,,	0	4	0
8	Sulphate of Lime	1 cwt.	1	0	0
9	Mineral Superphosphate	22½ lbs.	0	4	0
	and				
	Nitrate of Soda	22½ ,,	0	4	0
10	Mineral Superphosphate	22½ ,,	0	4	0
	and				
	Muriate of Potash	22½ ,,	0	4	0
11	No Manure	..	..		..

The artificial manures were sown by hand on the 11th of April; the clover was cut on the 12th of June for the first time, and a second cutting was obtained August 24th, 1867. The produce of each plot was carefully weighed on the same day, and as soon as cut, when the results incorporated in the following table were obtained :—

TABLE showing the Produce of Artificial Grasses (mixed Clover and Rye-grass) on Experimental Plots of $\frac{1}{20}$ of an Acre each, made at Escrick Park Home Farm, York, in 1867.

Plots.	Manure used.	Weight of Clover.								
		First Cutting.			Second Cutting.			Total.		
		cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
1	Nitrate of Soda	8	2	7	2	0	7	10	2	14
2	Sulphate of Ammonia ..	10	2	0	2	1	17	12	3	17
3	Mineral Superphosphate ..	5	2	14	2	2	9	8	0	23
4	Common Salt	5	2	16	2	2	7	8	0	16
5	No Manure	5	1	26	2	3	4	8	1	0
6	Muriate of Potash	6	1	21	3	1	14	9	3	7
7	Sulphate of Potash	5	1	12	2	2	7	7	3	19
8	Sulphate of Lime	4	1	23	2	2	3	6	3	26
9	Mineral Superphosphate and Nitrate of Soda	10	3	16	2	0	0	12	3	16
10	Mineral Superphosphate and Muriate of Potash	9	0	0	4	3	2	13	3	2
11	No Manure	6	0	17	2	3	2	8	3	19

Mr. Hull kindly furnished me with the following notes, which he took on the field during the progress of the experiments :—

The manures were sown on the 11th of April, and no perceptible change was produced by any one of them until the 23rd of April, when the clover-seeds on plot 1 and plot 9 could readily be distinguished from those on all the other plots by their darker green colour and more vigorous growth.

Plot 1 was dressed with nitrate of soda alone, and plot 9 with a mixture of nitrate of soda and superphosphate. Both plots had a darker green colour than the rest throughout the experiment.

The nitrate of soda on plot 1 encouraged the growth of the rye-grass to such an extent that it quite smothered the growth of the clover-plant.

Plot 2. *Sulphate of Ammonia.*—The rye-grass grew vigorously but was not so long and coarse as the rye-grass on the plot dressed with nitrate of soda, while it was superior in quality in comparison with the latter. The clover on plot grew fairly, but was weak.

Plot 3. *Mineral Superphosphate.*—Rye-grass good, but clover thin, very weak, and much blighted.

Plot 4. *Common Salt.*—Rye-grass and clover fair, but short.

Plot 5. *No Manure.*—Appearance of plant much like that on the preceding plot.

Plot 6. *Muriate of Potash.*—The clover on this plot was very good both as regards colour and vigour of growth, and the rye-grass also was strong and of good quality.

Plot 7. *Sulphate of Potash.*—Clover good, but rye-grass weak.

Plot 8. *Sulphate of Lime.*—Rye-grass very thin and unhealthy in appearance; the worst piece of the eleven experimental plots.

Plot 9. *Nitrate of Soda and Superphosphate.*—Clover-plant quite smothered by rye-grass, which grew very long and coarse, and of quality little better than good oat-straw.

Plot 10. *Superphosphate and Muriate of Potash.*—Decidedly the best plot; clover remarkably strong, with a good broad leaf of a dark green colour. Rye-grass also very vigorous and of excellent quality.

Plot 11. *No Manure.*—About the same as plots 3, 4, and 5.

Second Cutting.

Plot 1. There was scarcely any clover in the second cutting, and rye-grass also was very thin and weak.

Plot 2. Clover very weak; rye-grass much better than on the preceding plot, though short.

Plot 3. Much the same as plot 2; rye-grass not quite so strong.

Plot 4. Rye-grass and clover short and weak.

Plot 5. Clover fair; rye-grass short.

Plot 6. Rye-grass good; clover-leaves broad and of a good colour.

Plot 7. Clover good; but rye-grass weak and thin.

Plot 8. The produce on plot 8 small and weak.

Plot 9. Merely a few plants of clover were left on plot 9 after the first cutting, and the rye-grass was very thin and weak; the soil appearing to have been quite exhausted by the first cutting.

Plot 10. Clover very good, with a good broad and dark-coloured leaf; the rye-grass also strong and healthy. By far the best plot.

Plot 11. Much the same as 4 and 5.

We owe to Messrs. Lawes and Gilbert a series of most valuable and instructive field-experiments on the influence of different fertilising matters on the quantity and quality of the produce of permanent pastures. The changes which several of the fertilisers employed by Messrs. Lawes and Gilbert produced in the character of the herbage of several of their experimental plots are so instructive, that for some years past I have made it a point to pay a visit to Rothamsted Park at the time when the grass-crop is in the height of perfection. Having frequently seen with my own

eyes in what a remarkable degree the growth of true grasses, especially the coarser kinds, is encouraged by nitrogenous fertilisers, and having also noticed the changes which a mixture of salts of potash and superphosphate produces on permanent pasture in the relative proportions of leguminous plants and true grasses, I was quite prepared for similar changes in the produce of the Escrick experiments. But the differences in the quality of the produce of some of the experimental plots at Escrick Park were more striking than any which I had previously witnessed at Rothamsted Park or anywhere else.

The Italian rye-grass on plot 9 I found at harvest-time, as Mr. Hull truly observes, so exceedingly coarse, that it appeared scarcely better than good oat-straw, and very few clover-plants could be seen. Again, the effect which muriate of potash, and in a still higher degree a mixture of muriate of potash and superphosphate produced on the clover-plant, was truly magical.

I never before witnessed anything so striking and instructive as these experiments on artificial grasses. There must, of course, be a good reason why in this instance the quality as well as the quantity of the grass-crop were so much more powerfully affected by the different manures than I found to be the case in other experimental trials. We know that the character of the soil materially affects the quality and the weight of the crops we raise upon different classes of soil. It is, therefore, natural to connect the remarkable results obtained in the Escrick Park experiments with the peculiar character of the soil on the experimental field. I have, therefore, taken care to obtain a fair average sample from the field on which the grass-experiments were tried, and after drying the sample at 212° Fahr., I submitted it to a careful analysis, according to which the composition of the soil may be represented as follows:—

Composition of the Soil of the Field at Escrick Park Home Farm, on which the Experiments upon Clover-seeds were tried.

Organic matter and loss on heating	4·28
Oxide of iron	·61
Alumina	2·16
Carbonate of lime	·39
Sulphate of lime	·25
Carbonate of magnesia	·23
Potash	·14
Soda	·05
Phosphoric acid	·08
Insoluble siliceous matter (sand)	91·81
	100·00

Even a superficial inspection will show at once that this is an extremely poor and very light sandy soil. Mr. Coleman moreover

informs me that the field from which this soil was taken had been badly farmed, and that it was in consequence in a poor agricultural condition.

It will be noticed that this soil is remarkably poor in available potash, and I may add, in almost all the more valuable fertilising constituents found in good soils. The total amount of oxide of iron and alumina was not quite 3 per cent., and of lime there was not a half per cent. On the other hand it abounds in silica, for on examination I found the 92 per cent. of siliceous matter which enter into the composition of this soil to consist almost entirely of pure fine-grained quartz sand.

I need hardly say that a soil containing 92 per cent. of sand and very little clay, and a still smaller proportion of the more valuable soil-constituents has to be regarded as extremely poor. Such soils are readily exhausted by cropping, and though they will yield fair crops when liberally supplied with manure, they are naturally very unproductive.

The extreme poverty of this soil in available potash at once intelligibly explains the benefits which both the clover-seeds and the Italian rye-grass derived from the application of muriate of potash; and presents us with a good illustration of the utility of chemical analysis and the aid of the chemist, of which the practical farmer may occasionally avail himself with advantage. The analysis clearly points out a deficiency of potash and also of phosphoric acid; and hence the employment of potash-manures on land of that description may be recommended with confidence. The composition of land like that of the soil of the experimental field moreover shows that lime or clay-marl may be applied to it with advantage, and that it is impossible to grow any good roots, or barley, or wheat, or clover, on land of that character without giving it a liberal dressing of phosphoric manures. Moreover the loose and porous nature of the soil, and the want of a fair proportion of clay in it, clearly indicate the necessity of manuring it but very moderately with ammoniacal or nitrogenous manures; for as the proportion of available mineral constituents which enter into the composition of the ashes of our usual farm crops is but small, and the solubility of these matters in water is greatly facilitated by ammoniacal salts, such poor soils are all the more rapidly exhausted when the crops grown upon them are too liberally manured with fertilisers rich in nitrogenous matters, or in salts of ammonia.

For the sake of better comparison I have calculated the yield of each experimental plot for an acre, and placed the results in the subjoined Table:—

TABLE showing the Green Produce per Acre of 11 Plots of Artificial Grass (Clover-seeds and Rye-grass) grown at Escrick Park Home Farm, 1867.

Plots.	Manures used.	Produce per Acre.								
		First Cutting.			Second Cutting.			Total.		
		Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	Tons.	cwts.	lbs.
1	Nitrate of Soda	8	10	28	2	1	28	10	12	56
2	Sulphate of Ammonia ..	10	10	0	2	8	4	12	18	4
3	Mineral Superphosphate ..	5	12	56	2	11	68	8	4	12
4	Common Salt	5	12	96	2	11	28	8	4	12
5	No Manure..	5	9	72	2	15	80	8	5	40
6	Muriate of Potash	6	8	84	3	7	56	9	16	28
7	Sulphate of Potash	5	7	16	2	11	28	7	18	44
8	Sulphate of Lime	4	9	12	2	10	60	6	19	72
9	Mineral Superphosphate and Nitrate of Soda	10	17	96	2	0	0	12	17	96
10	Mineral Superphosphate and Muriate of Potash	9	0	0	4	15	40	13	15	40
11	No Manure..	6	3	4	2	15	40	8	18	44

An attentive perusal of the preceding figures will bring to light several particulars, on which a few observations may not be out of place:—

1. In the first place it will be noticed that two plots were left unmanured. In all experimental trials at least two, or if possible three plots, should be left unmanured. Although the crop in a field may appear quite even and the soil uniform as regards depth, texture, and general character, the weight of the produce of such a field invariably differs to some extent in different parts. Natural variations in the productive powers of different portions of the same experimental field must be expected to occur in all cases; but these variations must not surpass a certain limit, or else no fair and legitimate deductions with respect to the efficacy of the manuring matters employed can be made from the results of the experiments. Many of the anomalies which so much perplex the experimenting farmer I am inclined to think are often solely due to inequalities in the soil, or to differences in the agricultural condition of the several experimental plots. For this reason it is absolutely necessary in field-trials to determine whether the natural variations in the productive powers of different parts of the experimental field are not so great as to spoil the experiments altogether. In the case before us it will be seen that one of the unmanured plots yielded, when calculated per acre, 8 tons 5 cwts. and 40 lbs., and the second plot 8 tons 18 cwts. and 44 lbs.; the variations in the produce of the two plots thus amounted to 13 cwts. and 4 lbs., showing no greater difference than can be expected under favourable circumstances.

2. Neither common salt nor sulphate of potash appears to have had any effect upon the produce, for it will be seen that the weight of the clover-seeds on plots 4 and 7, dressed respectively

with salt and sulphate of potash, was somewhat less than that of the unmanured plots. I attach no value to the apparent diminution of the produce on plots 4 and 7, for the decrease is not sufficiently large to entitle us to infer from the result that the saline matters used on these two plots had an injurious effect upon the crop.

3. On plot 8 sulphate of lime was used at the rate of 1 ton per acre. This is a very large dose. Although sulphate of lime or gypsum is but sparingly soluble in water, and for that reason may be used with perfect safety in much larger quantities than in this experiment, provided it is well mixed with the soil, a large dose of finely-powdered gypsum, when applied as a top-dressing to young clover-seeds, appears to injure the plants and to retard their growth.

4. It is worthy of notice that whilst common salt had no effect upon the produce, muriate of potash materially increased it. We have here another direct proof that soda is incapable of taking the place of potash in the nutrition of plants.

5. On plot 3 mineral superphosphate alone had no effect whatever on the crop. This is an interesting result, for it seems to indicate that the great deficiency of potash, which is characteristic of the soil of the experimental-field, entirely prevented the display of the useful functions which we know perfectly well that superphosphate of lime does discharge on land of a better character. On poor light sandy soils we may learn from this that a purely mineral superphosphate cannot be used with advantage for clover-seeds. I may observe in passing that on such soils mineral superphosphate has even little effect upon root-crops, for which phosphatic manures are so largely used with the best effect.

6. It is remarkable that whilst plot 3, manured with mineral superphosphate, gave no increase whatever, and plot 6, manured with muriate of potash, gave an increase of 1 ton 4 cwts. and 42 lbs. over the average produce of the two unmanured plots (average produce 8 tons 11 cwts. and 98 lbs.), the mixture of both manures on plot 10 gave the largest weight of clover-seed and rye-grass per acre of any of the eleven experimental plots.

In the first cutting, plot 10 produced 9 tons, and in the second nearly 5 tons of green clover-seeds, or both cuttings yielded in exact weight 13 tons 15 cwts. and 40 lbs., which is an increase of 5 tons 3 cwts. and 64 lbs. per acre over the average yield of the two unmanured plots.

Plot 10 gave not only the largest increase per acre, but the quality of both the clover and rye-grass was much superior to that of the produce of any other of the various experimental plots.

7. There is another circumstance connected with the result obtained on Plot 10, which deserves the best attention of the practical agriculturist. It will be seen that, although the first cutting produced a heavy crop of clover-seeds of by far the best

quality of any of the experimental plots, the land was left in a better agricultural condition after the first cutting than where no manure at all was applied, and a much smaller weight of green clover-seeds was reaped at first; for on Plot 10, the second cutting yielded nearly 5 tons of green produce, in addition to the first, whereas the two unmanured plots No. 5 and No. 11 yielded only 2 tons 15 cwts. of additional produce in the second cutting. The liberal supply of available potash and soluble phosphates thus had the effect of greatly increasing the weight of the crop, improving its quality, and leaving the soil in a better agricultural condition for the next crop.

8. Again, it will be noticed that on Plot 6, on which muriate of potash alone was employed, the second cutting weighed more than the second cuttings of the other plots, except that of Plot 10, where superphosphate was added to the potash-salt. It therefore appears that the beneficial effects of potash on soils so poor in this element as the land on which these experiments were tried, has a more permanently beneficial effect than some of the fertilising matters which were used on other plots.

9. On the other hand, nitrate of soda unmistakably had a tendency to exhaust the land; for it will be noticed that on both the Plots 1 and 9, on which nitrate of soda was used, the second cuttings weighed less than those of the unmanured plots.

As already mentioned, the nitrate of soda on Plots 1 and 9 encouraged the growth of very coarse and inferior rye-grass which completely smothered the clover-plant.

When I saw the experimental field late in the autumn of 1867, after harvest, the contrast in the appearance of the various experimental plots was most striking. Whilst the land on Plots 1 and 10 appeared quite burned up and exhausted, and scarcely any clover was visible, the potash-plots could be readily distinguished by a dark-green colour and healthy look of the remaining herbage in which clover predominated.

We may thus learn from these experiments that nitrate of soda alone, or even in conjunction with superphosphate, should not be used as a top-dressing for artificial grasses on very poor sandy soils, like the soil of the experimental field, inasmuch as nitrates hasten the exhaustion of the potash naturally present in such soils in very small proportions. Indeed nitrate of soda and, in a minor degree, ammoniacal salts, are the worst artificial manures that can be used under such circumstances. It may further be observed that no just estimate can be formed of the real value of a special manure, if no account be taken of the condition in which the land is left after the crop has been removed from it. This is not the first time that I have noticed this tendency of nitrate of soda to produce rapid exhaustion of naturally poor soils, and I would therefore strongly recommend farmers to abstain from the

employment of it as a top-dressing for grass or corn-crops which are intended to be grown on naturally poor sandy soils.

Clover Experiments made in 1867, *at Tubney Warren, Abingdon.*

In the next place, I have to record another series of experiments, which were tried in 1867 at Tubney Warren Farm, Abingdon, by my friend and former pupil, Mr. James Kimber. In these experiments the same artificial manures were used as those employed in the preceding series.

In Mr. Kimber's experiments, a mixture of different kinds of clover-seeds was sown without rye or other grass-seeds on all the barley-crop in the preceding year, after a good one of swedes, manured with dung, and 3 cwts. of superphosphate per acre, and fed off by sheep eating corn.

The manures were applied early in March.

The effect of some of the dressings became very soon apparent in the yellow sickly appearance of several of the plots. The soil of the experimental field was in a good agricultural condition, but naturally it is very light and poor, and deficient in alkalies and lime. It contains nearly 90 per cent. of fine quartz-sand. The field on which the clovers were grown formed part of an old heath. It has been in cultivation eleven years, and had grown clover once before.

The second crop of clover on such light sandy land seldom comes to much. For this reason, the first crop was allowed to stand late, and get well matured, before it was cut. The crop was harvested in the middle of July, and weighed on the same day that it was cut. The following Table shows the result of the several experimental plots :—

TABLE showing the Manures employed, and the produce of Green Clover of 12 Experimental Plots of $\frac{1}{25}$ of an Acre each, at Tubney Warren, Abingdon, 1867.

Plots.	Manure used.	Quantity of Manure used per Acre.	Produce of Green Clover per Plot.	Produce of Green Clover per Acre.		
		cwts.	lbs.	Tons.	cwts.	lbs.
1	No Manure	..	749	6	13	84
2	Nitrate of Soda	4	823	7	6	108
3	Sulphate of Ammonia	4	870	7	15	40
4	Mineral Superphosphate	4	1084	9	13	64
5	Common Salt	4	828	7	7	96
6	No Manure	..	784	7	0	0
7	Muriate of Potash	4	819	7	6	28
8	Sulphate of Potash	4	867	7	14	92
9	Sulphate of Lime	4	891	7	19	12
10	Mineral Superphosphate .. .. Nitrate of Soda	4 4	1111	9	18	44
11	Mineral Superphosphate .. .. Muriate of Potash	4 4	1118	9	19	72
12	No Manure	..	737	6	11	68

The preceding results are interesting in several points of view. Amongst other particulars they show that the experimental field at Tubney Warren was in a better agricultural condition than the field on which the experiments were tried at Escrick Park. The farmyard manure and artificials which had been used in the year preceding barley for raising a crop of swedes told favourably upon the land; moreover the swedes, which turned out a good crop, were fed off the land by sheep, liberally supplied with corn in addition to the roots; and by these means the field, no doubt, received more fertilising matters than could be appropriated by the barley preceding the clover-crop. Consequently the same powerful effects were not produced by these dressings, as those which in the preceding experiments had such a marked influence on the crop. The soil, though naturally poor in potash, evidently contained enough of this element in proportion to other available soil-constituents to meet the wants of the clover-crop, for neither muriate nor sulphate of potash materially increased the green produce.

That the experimental plots were uniform as regards productive power appears from the results obtained on the three unmanured plots, Nos. 1, 6, and 7, which, as will be seen, produced respectively 6 tons 13 cwts. 87 lbs., 7 tons, and 6 tons 11 cwts. 68 lbs.; thus showing differences quite as inconsiderable as can be expected in the most successful experiments.

It is worthy of observation that neither the nitrate of soda on Plot 1, nor the sulphate of ammonia on Plot 2, had much effect. This seems to indicate either that the land, being in a good agricultural condition, contained a sufficient amount of nitrogenous plant-food or that clover is not materially benefited by a fertiliser, which, like nitrate of soda, supplies only nitrogen in the shape of nitric acid; or by one which, like sulphate of ammonia, supplies only ammonia or sulphuric acid.

A careful perusal of the results of these experiments, on the other hand, clearly shows that the soil upon which the clover was grown was poor in available phosphoric acid, and contained enough of all the other essential fertilising matters to meet the requirements of the clover-crop. Hence the addition of 4 cwts. of a purely mineral superphosphate gave a considerable increase; this, however, was not sensibly raised on Plots 10 and 11, upon which the same quantity of superphosphate was used in conjunction with nitrate of soda and muriate of potash.

We may learn from these facts the important lesson to take particular account in all field trials of the agricultural condition in which the land may be found at the time when experiments are made.

If I am not mistaken, we may also deduce from the results of

the preceding experiments that even on a naturally poor sandy soil potash manures do not produce much effect, when the soil, by a good system of farming, has been brought into a fair state of productiveness, but that the application of purely phosphatic manures to such land is more likely to be beneficial.

Mr. Kimber, in the course of the experiments, took the following field-notes of the appearance of the clovers, which are not without interest:—

Notes made in the Field, April 13th.

Plot 3 (Sulphate of ammonia), slightly affected; rather pale.
„ 5 (Common salt), very much and injuriously affected; very yellow.
„ 7 (Muriate of potash), very yellow; though not so much as Plot 5.
„ 8 (Sulphate of potash), slightly pale and yellow.
„ 11 (Muriate of potash and superphosphate), much affected by the manure; very yellow.

Notes made May 22nd.

Plot 1 (No manure), useful fair crop.
„ 2 (Nitrate of soda), about the same as Plot 1. Blades of grass and weeds darker in colour, but little difference in the clover-plants on Plots 1 and 2.
„ 3 (Sulphate of ammonia), slightly better than Plot 2.
„ 4 (Mineral superphosphate), much higher and better than Plots 1, 2, and 3.
„ 5 (Common salt), worse than any of the preceding plots.
„ 6 (No manure), slightly better than Plot 5.
„ 7 (Muriate of potash), rather better than Plot 6.
„ 8 (Sulphate of potash), better than Plot 7, and darker in colour.
„ 9 (Sulphate of lime), about the same as Plot 8.
„ 10 (Mineral superphosphate and nitrate of soda), darker in colour and better than Plots 8 and 9.
„ 11 (Mineral superphosphate and muriate of potash), about as good as Plot 10, but paler; affected rather injuriously by the manures in spots.
„ 12 (No manure), not so high and good as Plot 11.

The clover-plants, it appears, were too powerfully affected at first by the more soluble saline manures. However, several of the plots which in the beginning looked very yellow had gradually improved, and towards the conclusion of the experiments quite recovered from the too energetic effects of the saline manures.

The after crop of clover was not weighed, but the following notes were taken in the field:—

Plots 1 and 2. Accidentally mutilated by sheep.

Plot 3. Fair crop; rather better than Plot 6.

Plot 4. Rather better than Plot 3.

Plots 5 and 6. Not so good as Plot 4.

Plots 7 and 8. Very little difference between these and Plots 5 and 6.

Plot 9. Rather better than Plots 5, 6, 7, and 8.

Plot 10. Not so good as any of the preceding plots: many clover-plants have died.

Plot 11. By far the best plot.

Plot 12. About the same as Plots 5 and 6.

The after-crop on Plot 10, manured with nitrate of soda and superphosphate, appears to have been injuriously affected by the nitrate of soda; whilst, on the contrary, the muriate of potash, which in conjunction with superphosphate was applied to Plot 11, has had a favourable effect on the after-crop.

Since saline top-dressings at first check the healthy growth of the clover-crop and injuriously affect it, especially in dry weather, it is very desirable to apply such dressings quite early in spring. Perhaps the middle of February is a good time for putting the manure on the land, inasmuch as the saline manures will then have a better chance to be thoroughly washed by the rain into the soil before an active growth begins than when the application is delayed until a later period.

Experiments on Clover-Seeds, made in 1868, *at Menagerie Farm, Escrick, York, by Messrs. Coleman and Hull.*

Having obtained, in 1867, very striking results when salts of potash and superphosphate, nitrate of soda, and other top-dressings were applied to artificial grasses on a very light, poor, sandy soil, I was anxious to ascertain whether similar results would be realised in another season on land of a similar character on the Escrick estate.

Mr. Coleman willingly acceded to my request to repeat the experiments on another part of the farm, and with the assistance of Mr. Hull, who took much interest and an active part in carrying out the preceding experiments, a new series was begun in the spring of 1868. The same top-dressings which were employed in the preceding year were applied again in 1868 to eleven plots, of 1-20th acre each, of clover-seeds, in precisely the same quantities as before. The field, of which 11 adjoining plots were set apart, grew an even and healthy-looking plant of clover-seeds; it was a tolerably level field, and apparently uniform as regards depth and its general physical and chemical characters. The soil of the experimental clover-field closely resembled that on which the top-dressings were tried in 1867; like the latter, it contained over 90 per cent. of pure and fine

quartz-sand, little lime, and still less available alkalies and phosphoric acid. The whole field was sown with mixed seeds, at the rate per acre of 6 lbs. of red clover, 1 lb. of alsike, and 1 lb. of white clover, $\frac{1}{2}$ bushel of Italian rye-grass, and $\frac{1}{2}$ bushel of Pacey's rye-grass. The manures were sown by hand on the 23rd of April, and the crop was cut on the 11th of June and weighed on the same day. A second cutting was made on the 23rd of July. The results obtained are incorporated in the following Tables :—

TABLE showing the Manures employed, and Produce obtained, from 11 Experimental Clover-plots at Menagerie Farm, Escrick, York, 1868. Each plot $\frac{1}{20}$ of an Acre.

Plots.	Manures used.	Quantity of Manure per Plot.	Weight of Green Produce, First Cutting.		Weight of Produce, Second Cutting.		Total Produce.	
		lbs.	stones.	lbs.	stones.	lbs.	stones.	lbs.
1	Nitrate of Soda	$22\frac{1}{2}$	56	0	6	0	62	0
2	Sulphate of Ammonia ..	$22\frac{1}{2}$	56	0	7	3	63	3
3	Mineral Superphosphate	$22\frac{1}{2}$	45	0	7	7	52	7
4	Common Salt	$22\frac{1}{2}$	43	7	8	2	51	9
5	No Manure	..	37	4	7	9	44	13
6	Muriate of Potash	$22\frac{1}{2}$	46	7	10	9	47	2
7	Sulphate of Potash ..	$22\frac{1}{2}$	50	7	11	0	61	7
8	Sulphate of Lime	cwt. 1	44	7	9	5	53	12
9	Mineral Superphosphate and Nitrate of Soda	lbs. $22\frac{1}{2}$ / $22\frac{1}{2}$	55	3	7	0	62	3
10	Mineral Superphosphate and Muriate of Potash	$22\frac{1}{2}$ / $22\frac{1}{2}$	56	7	12	10	69	3
11	No Manure	..	37	7	7	5	44	12

TABLE giving Weight of Green Produce, calculated per Acre.

Plots.	Manures used.	Quantity per Acre.	First Cutting.				Second Cutting.				Total Produce.			
		cwts.	Tons.	cwts.	qrs.	lbs.	Tons.	cwts.	qrs.	lbs.	Tons.	cwts.	qrs.	lbs.
1	Nitrate of Soda	4	7	0	0	0	0	15	0	0	7	15	0	0
2	Sulphate of Ammonia	4	7	0	0	0	0	18	0	4	7	18	0	4
3	Mineral Superphosphate	4	5	12	2	0	0	18	3	0	6	11	1	0
4	Common Salt	4	5	8	3	0	1	0	1	12	6	9	0	12
5	No Manure..	..	4	13	0	27	0	19	0	12	5	12	1	8
6	Muriate of Potash ..	4	5	16	1	0	1	6	2	12	7	2	3	12
7	Sulphate of Potash ..	4	6	6	1	0	1	7	2	0	7	13	3	0
8	Sulphate of Lime ..	ton. 1	5	11	1	0	1	3	1	16	6	14	2	16
9	Mineral Superphosphate and Nitrate of Soda	cwts. 4 / 4	6	18	0	4	0	17	2	0	7	15	2	4
10	Mineral Superphosphate and Muriate of Potash ..	4 / 4	7	1	1	0	1	11	3	4	8	13	0	4
11	No Manure..	..	7	13	3	0	0	18	1	16	5	12	0	16

It appears from these experiments:—

1. That nitrate of soda gave nearly the same increase as sulphate of ammonia: that is, about 2 tons more than the produce from the two unmanured plots.

2. That the two unmanured plots yielded almost exactly the same weight of clover. Plot No. 5 produced 5 tons 12 cwts. 36 lbs.; and Plot 11, the second unmanured plot, 5 tons 12 cwts. and 16 lbs.. As one of the unmanured plots was at the end of the piece of ground selected for the experiments and the other occupied the middle of the 11 plots, the soil in the several plots may be presumed to have been naturally uniform in its general character and productive powers.

3. That common salt, which in the previous year showed little effect upon the clover, gave an appreciable increase in 1868, both in the first and in the second cutting.

4. That the heaviest crop was again produced by a mixture of superphosphate of lime and muriate of potash.

5. That on all the three plots where salts of potash were used, namely, Plot 6 (muriate of potash), Plot 7 (sulphate of potash), and Plot 10 (muriate of potash and superphosphate), but especially the last-named plot, the second cutting of clover weighed more than the second cutting from the unmanured plots.

6. That, on the other hand, the two plots which received a dressing of nitrate of soda yielded less clover on the second cutting than the unmanured plots.

In comparing the weights of green clover-seeds in 1868 with those obtained in the preceding year, it appears that the general experience gained at Escrick in 1867 is fully borne out by the results obtained in the more recent experiments of 1868.

In 1867, however, the yield of all the experimental plots was much greater than in 1868; a difference to be accounted for by the unusually dry summer of the latter year; the extremely dry and warm weather which prevailed between the first and second cuttings fully explaining the miserable yield of clover on the 23rd of July, when the second cuttings were made. It is interesting, however, to notice that even under such adverse circumstances more clover was cut on the 23rd of July on the plot dressed with superphosphate and muriate of potash than on any other plot, and that the smallest crop was obtained on the second cutting of Plot 1, dressed with nitrate of soda.

In a dry season, neither nitrate of soda nor sulphate of ammonia acts nearly so beneficially upon vegetation as in moderately wet weather; for it appears that these saline matters, unless much diluted by the rainfall and thoroughly diffused in the soil, cannot exert a beneficial influence even upon those crops upon which they produce the best effect in a favourable

season. Nitrate of soda is especially apt to burn up vegetation in dry weather, and for this reason should always be used with caution and sparingly. Salt, on the other hand, is evidently beneficial to grass-crops on light land in a dry season.

In accordance with the experiments made at Escrick in the preceding year, sulphate of ammonia, and in a still higher degree nitrate of soda, encouraged the growth of the Italian and Pacey's rye-grass to an extraordinary extent at the expense of clover; whilst the mixture of muriate of potash and superphosphate, as in the preceding year, not only produced the heaviest crop of any of the eleven experimental plots, but also surpassed them all in quality.

Of the green produce of Plot 10, dressed with such a mixture, clovers formed a large proportion of the bulk, and both the clover and rye-grass were fine and succulent. Mr. Coleman informs me that the hay made on Plot 10 would be worth fully 1*l.* a ton more than that made on Plot 1, dressed with nitrate of soda.

The Escrick experiments in 1868 thus afford another proof that on poor, sandy soils we cannot hope to grow a paying and nutritious crop of clover unless we supply the soil, in some shape or other, with potash and available phosphoric acid: two constituents which are greatly needed in such soils, and which, therefore, have a better effect than any other fertilising matters that may be applied to the land.

Experiments on Artificial Grasses (Clover-Seeds), made in 1868 *at Tyrwarnhaite Farm, in the Parish of St. Agnes, Redruth, Cornwall, by Mr. J. Sidney Davey.*

In the next place, I have briefly to report the results of another series of experiments which Mr. Sidney Davey readily undertook for me and carefully carried out in the past season. The same top-dressings which were employed in all the preceding experiments having been supplied, they were sown on the 11th of April on eleven plots, 1-20th of an acre each plot.

The soil of the experimental field was a naturally poor, sandy loam, containing but little lime and only a moderate amount of clay.

The grass-crop was cut on the 8th of June, and the green produce on the same day. The extraordinary dry summer of 1868 checked the growth of the grass so much that it was not considered worth while to make a second cutting.

The following Table embodies the results of the weighings of the several clover-plots:—

TABLE showing the Manures used, and the Weight of Green Produce from 11 Plots of $\frac{1}{20}$ of an Acre of Clover-seeds, at St. Agnes, Redruth, and Produce calculated per Acre.

Plots.	Manures used.	Quantity of Manure per $\frac{1}{20}$ of an Acre.	Produce per $\frac{1}{20}$ of an Acre.			Produce per Acre.		
		lbs.	cwts.	qrs.	lbs.	Tons.	cwts.	lbs.
1	Nitrate of Soda	22½	6	2	11	6	11	108
2	Sulphate of Ammonia ..	22½	6	2	25	6	15	52
3	Mineral Superphosphate	22½	6	2	15	6	12	76
4	Common Salt	22½	5	3	2	5	15	40
5	No Manure	..	5	2	10	5	11	88
6	Muriate of Potash	22½	6	1	12	6	7	16
7	Sulphate of Potash ..	22½	6	0	8	6	1	48
8	Sulphate of Lime	56	5	3	11	5	16	108
9	Mineral Superphosphate and Nitrate of Soda	22½ / 22½	8	2	27	8	14	92
10	Mineral Superphosphate and Muriate of Potash	22½ / 22½	8	0	23	8	4	12
11	No Manure	..	5	2	20	5	13	64

It will be seen that in the preceding experiments common salt and sulphate of lime produced no effect.

Mineral superphosphate alone materially encouraged the growth of the clovers, and nitrate of soda and sulphate of ammonia that of Italian rye-grass.

It is remarkable, however, that neither nitrate of soda nor sulphate of ammonia gave a better result than mineral superphosphate alone. Taking no account of the small differences in the weight of the produce of the first three plots, we may say that all three gave the same weight of clover-seeds. But when superphosphate was added to the nitrate of soda, the produce of Plot 1 rose from 6 tons 12 cwts. (in round numbers) to 8 tons 15 cwts.: that is to say, Plot 10, manured with a mixture of superphosphate and nitrate of soda, gave an increase of 2 tons 3 cwts. of clover-seeds over and above the yield of the plot manured with nitrate of soda only. Very nearly the same increase was obtained when superphosphate was added to muriate of potash; and, in conformity with other experiments, the produce was of a much inferior character on Plot 10 than on Plot 9, upon which nitrate of soda was employed.

Both muriate and sulphate of potash increased the crop by nearly 1 ton, showing that potash-salts are more efficacious fertilising matters than soda-salts,—at least, on soils which like the soil of the experimental field was deficient in potash.

On the whole, the preceding experiments furnish conclusive evidence of the deficiency of available potash-compounds and phosphates in the soil of the experimental field, and that it is not desirable to top-dress such soils with nitrate of soda.

Experiments in Permanent Pasture.

Two years ago I set on foot a series of experiments in permanent pasture. The scheme which I suggested embraced the following manures:—

Quicklime,
A mixture of quicklime and salt,
Common salt,
Crude potash-salts,
Mineral superphosphate,
Peruvian guano, and
Bone-dust.

For experiments on permanent pasture not less than 1-10th part of an acre should be set apart for each trial; and as some of the fertilisers which are used for enriching pasture-land act but slowly, and others exert a beneficial influence on the herbage for a succession of years, whilst still others affect the grass-lands only in the year of their application, it is absolutely necessary not to confine the experiments to a single season, but to take field observations and to weigh the crop for a period of at least four years in succession.

My object in giving publicity to the following experiments is mainly to induce as many persons as possible to adopt an uniform plan, in order that the same experiments may be made under a great variety of conditions as regards soil and situation.

Experiments on Permanent Pasture made in 1867 by Mr. John Lloyd, at Ashwick, Hatfield, Herts.

In a 10-acre meadow, 1 acre was set apart and divided into plots of 1-10th of an acre each.

These ten plots were treated as follows as regards manure:—

Plots.	Name of Manure.	Quantity of Manure per Plot.	Rate per Acre.
1	Quick-lime	5 bush.	50 bush.
2	Quick-lime .. .. and Common Salt	5 „ 56 lbs.	50 „ 5 cwts.
3	Fine Bone-dust	1½ cwt.	15 „
4	Mineral Superphosphate .. .. and Crude German Potash-salts	56 lbs. 56 „	5 „ 5 „
5	No Manure	..	..
6	Common Salt	56 „	5 „
7	Peruvian Guano	56 „	5 „
8	Crude German Potash-salts	56 „	5 „
9	Mineral Superphosphate .. .. and Peruvian Guano	56 „ 56 „	5 „ 5 „
10	No Manure	..	..

The quick-lime, in five small heaps, was put on each of the Plots 2 and 3, on the 23rd of March, 1867. After being slaked by the rain it was spread on the 27th of March; the other manures were sown by hand on the 23rd of the same month. Immediately after the manures were sown there was a heavy fall of rain. All the plots were rolled and chain-harrowed on the 1st of April.

Mr. Lloyd kindly furnished me with the following notes on the appearance of the grass on the ten experimental plots.

Field Notes, April 10th.

Plot 1 (quick-lime); 2 (quick-lime and salt); and Plot 6 (common salt) appeared much burnt.

Plot 3 (bone-dust) was slightly darker in colour than the unmanured plots, but rather patchy.

Plot 4 (crude potash-salts and superphosphate) and Plot 8 (crude potash salts) looked brown, the latter more so than the former; both were nearly as much burnt as Plots 1, 2, and 6.

Plots 7 and 9 (Peruvian guano) had an uniform and dark-green appearance.

June 9th.

No perceptible difference in Plots 1, 2, 5, and 6.

Plot 3 rather irregular, with patches of very heavy grass.

Plot 4 somewhat stunted in growth.

Plot 8 (German potash-salts) looked stunted and rather wiry.

Plot 7 (Peruvian guano) very luxuriant.

Plot 9 (Peruvian guano and superphosphate) very heavy; the grass a good deal laid.

The meadow on which the experiments were tried was mown once a year during the last five seasons. It was drained in the winter of 1864-5, and then dressed with about 4 tons of refuse gas-lime, applied as a compost with the cleanings from a pond and road-scrapings. Considerable quantities of roots, corn, and cake were also consumed on it by stock at various times. This field at one time was very poor, but now grows a fair average crop for this part of the country.

In 1867, snow fell in the latter end of March and the latter end of April, whilst in the greater part of May the weather was showery and cold.

The ten plots were carefully mown on the 24th of June and weighed the same day, when the following results were obtained:—

TABLE showing Manures used, and Weight of Grass per Plot and per Acre of Experimental Permanent Pasture Field at Ashwick, Hatfield, Herts.

Plots.	Manure used.	Produce per Plot.		Produce per Acre.		
		cwts.	lbs.	Tons.	cwts.	lbs.
1	Quick-lime	4	46	2	14	12
2	Quick-lime and Salt	5	75	2	16	78
3	Bone-dust	5	64	2	16	18
4	Mineral Superphosphate and Crude German Potash-salts	7	4	3	10	40
5	No Manure	5	98	2	18	84
6	Common Salt	6	44	3	3	104
7	Peruvian Guano	10	37	5	3	34
8	German Crude Potash-salts	5	89	2	17	106
9	Mineral Superphosphate and Peruvian Guano	10	68	5	6	8
10	No Manure	5	50	2	14	52
	Average produce of the 2 unmanured Plots	5	74	2	16	68

A comparison of the preceding figures shows :—

1. Quick-lime appears to have burnt up the grass to some extent. It will be interesting to watch the effect which the lime will have in the following seasons.

2. The mixture of salt and quick-lime gave no larger return than the unmanured plots.

3. The same was the case with the bone-dust. The bone-dust sown in the spring evidently was not acted upon sufficiently by the weather, and consequently produced no effect whatever in the season in which it was applied.

4. Mineral superphosphate and crude potash-salts gave but a small increase. It will be seen that plot 4 yielded not quite 14 cwts. more grass than the average produce of the two unmanured plots.

5. Common salt gave a somewhat heavier weight of grass than crude German potash-salts, which yielded about as much as the unmanured plots.

6. Peruvian guano yielded a large increase, and the heaviest crop, amounting to nearly twice the weight of the grass on the unmanured plot, was obtained by the mixture of superphosphate and guano.

The field was left for a second crop.

July, 1867, was a wet month; but although the grass did not grow much, a considerable difference was observed in the appearance of the plots.

Plot 1 (quick-lime) looked rather brown and burnt.

The two plots manured with guano, 7 and 9, were dark-green, and had much more grass upon them than any other.

Plots 4 and 8, manured with crude potash-salts, were distin-

guished from the others by an abundant growth of both white and red clover.

The rest of the experimental plots looked pretty much alike.

Throughout August and September the grass grew so little that it was not thought worth while to cut and weigh the second crop. Towards the end of October, however, the grass appeared to have grown so much more, that it was determined to mow and weigh it.

The plots accordingly were mown on the 30th of October and weighed on the same day. The grass was rather damp when cut, and consequently weighed rather more than it would have done under ordinary circumstances. The first crop was quite dry when cut and weighed, and no comparison, therefore, can be drawn between the weights of the first and second cuttings.

Unfortunately the grass on plots 2, 5, and 6 was cut before the 30th of October, and consequently no mention is made of these plots in the following Table, in which is stated the weight of the grass of the remaining plots:—

TABLE showing the weight of Second Cutting of Grass of Experimental Plots at Ashwick, Hatfield, and Produce calculated per Acre.

Plots.	Manure used.	Produce per Plot.		Produce per Acre.		
		cwt.	lbs.			
1	Quick-lime	5	33	2	12	106
3	Bone-dust	4	31	2	2	88
4	Mineral Superphosphate and Crude Potash-salts	4	51	2	4	62
7	Guano	5	16	2	11	48
8	Guano and Superphosphate	5	30	2	12	76
9	Crude Potash-salts	5	18½	2	11	73
10	No Manure	4	48½	2	4	37

The two guano-plots, it will be seen, gave the heaviest crop, and bone-dust had no effect upon the second crop. On November the 7th, after the plots were all cleared, forty ewes were put on the enclosed experimental acre and kept upon it till November 12th, to eat down any grass left uncut.

Experiments on Permanent Pasture, made in 1868 *at Escrick Park, York.*

The same manures which were used in the preceding experiments were employed at Escrick, and in precisely the same quantities. There was scarcely any clover in the poor rough grass, which grew on a sandy soil of the most infertile character. The pasture probably was never dressed before with any manure.

The long-continued dry and hot weather in the summer of 1868 told very unfavourably upon the grass, which was much burnt,

especially on the plots dressed with common salt and with crude potash-salts.

The manures were sown towards the end of March and the grass mown only once on the 25th of June, when the results embodied in the subjoined Table were obtained:—

TABLE showing Manures employed, and Weight of Grass of 10 Experimental Plots of $\frac{1}{10}$ of an Acre each of Permanent Pasture, at Escrick Park, York.

Plots.	Manures used.	Quantity of Manure per Plot.	Produce per Plot.		Produce per Acre.			
			stones.	lbs.	Tons.	cwts.	qrs.	lbs.
1	Quick-lime	5 bush.	16	7	1	0	2	14
2	Quick-lime .. .. and Sand	5 ,, 56 lbs.	19	3	1	4	0	2
3	Fine Bone-dust	$1\frac{1}{2}$ cwt.	26	9	1	13	1	6
4	Mineral Superphosphate .. and Crude German Potash-salts	56 lbs. 56 ,,	22	7	1	8	0	14
5	No Manure	..	8	7	0	10	2	14
6	Common Salt	56 ,,	17	9	1	2	0	6
7	Peruvian Guano	56 ,,	39	7	2	9	1	14
8	Crude German Potash-salts	56 ,,	24	12	1	11	0	8
9	Mineral Superphosphate .. and Peruvian Guano	56 ,, 56 ,,	45	0	2	16	1	0
10	No Manure	..	12	9	0	15	3	6

It will be seen that the mixture of Peruvian guano and superphosphate, and next to it Peruvian guano, gave the best result.

Bone-dust followed next in point of efficacy, and then superphosphate and potash-salts.

The fact of the unmanured portion of the pasture in the dry season of 1868 yielding a miserable crop, affords the best proof of the exhausted condition of the meadow land, and explains the fact, that notwithstanding the adverse season, all the manures told more or less upon the yield of the grass-crop. Further observation in succeeding seasons on the after-effects of the several applications are required before any legitimate conclusions can be drawn with regard to the economy of the several dressings.

In conclusion I have to report another series of experiments with the same fertilisers which were employed at Escrick, and which were made in 1868 on permanent pasture by Mr. J. Sidney Davey, of St. Agnes, Redruth.

Experiments on Permanent Pasture at Tyrwarnhaite Farm, in the Parish of St. Agnes, Redruth, in 1868.

The manures were sown on the 23rd of March and the grass cut and weighed on the 27th of June, 1868, when the following results were obtained:—

Plots.	Name of Manure.	Quantity of Manure per Plot of $\frac{1}{10}$ of an Acre.	Weight of Grass per Plot.			Weight of Grass per Acre.		
			cwts.	qrs.	lbs.	Tons.	cwts.	lbs.
1	Quick-lime	10 bush.	9	2	5	4	15	50
2	Quick-lime .. .. and Salt	10 „ / 56 lbs.	10	3	1	5	7	66
3	Fine Bone-dust	$1\frac{1}{2}$ cwt.	13	3	15	6	19	82
4	Mineral Superphosphate .. and Crude German Potash-salts..	56 lbs. / 56 „	14	1	20	7	4	32
5	No Manure	..	13	0	24	6	12	16
6	Common Salt..	56 „	11	3	13	5	18	74
7	Peruvian Guano	56 „	18	1	3	9	2	86
8	Crude German Potash-salts..	56 „	12	3	6	6	8	4
9	Mineral Superphosphate .. and Peruvian Guano	56 „ / 56 „	19	1	1	9	12	66
10	No Manure	..	12	3	13	6	8	74

A glance at the preceding experiments shows:—

1. That the quick-lime on plots 1 and 2 burnt up to a considerable extent the grass-land, and diminished the yield of grass in consequence.

2. That bone-dust had little or no effect in the first year of its application.

3. That the increase on plot 4, manured with superphosphate and crude potash-salts, was inconsiderable. In all probability superphosphate alone would have produced more grass than its mixture with crude potash-salts, which appeared to have had an injurious effect upon the crop.

4. That the dressing with common salt diminished the weight of the grass-crop.

5. That crude German potash-salts also rather diminished the produce.

6. That Peruvian guano, and in a still higher degree the mixture of Peruvian guano with superphosphate, produced a large increase in the weight of the grass-crop.

In conclusion it may be stated that the field on which the experiments were tried was laid down in grass about fifteen years ago. It was fairly productive land, and had been dressed at various times with shell-sand. The soil is a moderately-stiff sandy loam, and contained an abundance of carbonate of lime in the shape of shell-sand.

Laboratory, 11, *Salisbury-square, Fleet-street,*
January, 1869.

IV.—*The Influence of Climate and Hereditary Character upon Sheep.* By Professor TANNER.

IN a previous communication to this Journal* I have drawn attention to the principles which should regulate the breeding of farm stock according as the purity of breed, the production of milk, or the formation of meat, may be the object to be attained. In a subsequent paper† I continued the subject by some remarks upon the reproductive powers of domesticated animals, more particularly with reference to those unhealthy conditions of animal life which cause much trouble to stock-masters by barrenness in its several classes and degrees. I propose in the present paper to notice some of those systems of management under which these difficulties are avoided, and to point out the causes which contribute so powerfully to this result.

Our mountain breeds of cattle and sheep offer the best examples of that healthy condition of animal life which is alike a preservative against disease, and the source of that vital energy so necessary to be engrafted upon our various improved breeds of farm stock. In order to judge fairly of these animals we must notice the circumstances under which they are reared, and their respective vital conditions. The principles which regulate the distribution and development of animal life are full of interest, and the regularity with which they act cannot fail to arrest our attention; for in whatever part of the globe inquiry may be instituted, influences will be found in operation similar to those observable within our more limited sphere, but the results are more striking because of the greater variations of climate and the general habits of life. Above the hilly ranges on which cattle graze are generally others of higher level and more rugged character to which the class of stock, accustomed to mountain sides, dare not ascend. On the scanty vegetation of these higher levels sheep and goats feed, and they become almost as wild as if they had never experienced the care of man. Little, indeed, is done for them during the summer and autumn months beyond supplying them with their periodical allowance of salt, and yet this vegetation, which is almost inaccessible, becomes a source of profit by its conversion into coarse wool and fine mutton.

Observation limited to our own country will disclose to us along the western coasts of England and Wales a bold and

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* 'Journal of Royal Agricultural Society,' vol. xxii. p. 1.
† Ibid., vol. i. p. 262, second series.

extensive series of mountain ranges, which, whilst presenting some of the grandest features of English scenery, exert a powerful influence upon local climate, and consequently on animal and vegetable life. Sheep will here be found grazing more than 2000 feet above the level of the sea, in an atmosphere often charged with moisture to its fullest limit. At times a drier atmosphere prevails; still, this is exceptional, whilst at other times the air is not only moist, but, even when the moisture is not falling in the form of rain, a complete mist envelopes everything. The annual amount of rainfall ranges from 75 to 150 inches. The elevation of this district necessarily occasions great severity of cold in the winter and spring months, and these are followed by a short summer and autumn, in which the growth of the year has to be made. On the southern portion of this district the climate is less severe in its character, and its influence less energetic, but even under the most favourable conditions there are severities to be endured and privations to be encountered which call for a stout heart in the farmer and a sound constitution in his stock. The peculiar natural features of this mountain district are great elevation, severe cold, heavy falls of rain, abundance of mists, steep feeding ground, short and scanty herbage, and often very poor food.

Occupying this extensive tract of grazing land we find a peculiar class of animals. Upon the highest ranges sheep are the principal stock, but the lower levels are occupied by a hardy class of cattle; indeed both cattle and sheep will be found worthy of notice, but it is to the latter that I shall more particularly draw attention, because they forcibly illustrate the principles we have to consider. Such mountain sheep are anything but pleasing to the eye of a farmer accustomed to land of better quality, and situated under more favourable circumstances. A pen of genuine mountain sheep in one of our exhibitions would excite much attention and probably amusement from the striking contrast they present to the representatives of our improved flocks. It is, indeed, probable that they would be regarded as sheep not only ill-shaped but of bad quality, and yet upon further consideration of their merits we shall find much that is valuable. The differences observable between our various breeds of mountain sheep are few and of secondary importance, but the points upon which they agree are very essential and well worthy of attention.

Another class of sheep which have to play an important part with these hardy little mountaineers may be distinguished as the hill sheep of England. These consist of the Cheviots, Shropshire Downs, Ryelands, Cotswold, and Notts, and occupy an extensive tract of land eastward of the mountainous district

already referred to. The climate of this district varies in a marked degree from that of the mountains, the temperature being higher, and the fall of rain decreased, and ranging from 30 to 45 inches annually. The soil is of better quality, and more abundant supplies of food are available. Under these more favourable circumstances it has been found highly remunerative, if not absolutely necessary for the profitable occupation of land, to have sheep which at 12 months old are of double the weight of the unimproved sheep at 3 or 4 years old. The unimproved breeds from which all of this class have been produced were originally akin to our mountain breeds of the present time, but to attain this result we have so altered the formation of their bodies and their internal organisation, that we have rendered them unable to withstand such severities of climate and such privations as their unimproved ancestry had to undergo. By our hedges and other enclosures we have given protection from the force of the wind; by drainage we have lessened the injurious influence of rain and raised the temperature of the soil; and by more liberal feeding we have given the blood additional capabilities for maintaining the heat and growth of the body. But if we carry this modification further than is conducive to health, or if we remove the sheep from their legitimate district to one in which the climate is more severe, we find that they become sickly and unprofitable. As a rule, good progress has been made with our hill sheep without causing much detriment to their breeding powers and their supply of milk; but, where we go too fast and get the flock too fine and tender, we soon have evidence of the fact by difficulties of various kinds which influence their reproductive powers. So also the rapid production of meat has been very generally attended by a sacrifice of quality; but, possibly, with a better knowledge of the character and constituents of rich juicy meat, and the conditions essential to its formation, we may be enabled to obtain more perfect meat at an early period of animal life.

Leicester sheep—it may be observed in passing—present, in every point of character, just the opposite extremes to those of a genuine mountain sheep. Instead of wild and active habits they possess quiet and docile dispositions; instead of light and hairy fleeces they yield a heavy class of wool of fine quality; instead of a coarse head with horns they have a fine clean countenance; flat sides are in their case superseded by well-rounded ribs, and a narrow back gives place to one both broad and level, whilst instead of a deep and narrow chest and light quarters will be observed a broad chest and a heavy production of meat. But with all the beauty of the Leicesters their use as a pure breed must either be limited to districts possessing a favourable

climate, or they must be rendered more hardy, in other words, less perfect in the special features which now recommend them to public favour.

Mountain sheep, of all breeds, are remarkable for possessing great constitutional strength, whereby they can withstand severities of climate that would be fatal to more delicate animals. In speaking, however, of constitutional strength and delicacy of health, a clear understanding of what is meant by these terms is desirable, since without such understanding we are liable to overlook the simple truths they express. These distinctions spring from the action of a beneficent law of nature, whereby animals become naturalised to certain districts—that is, within certain limits they undergo such a variation of bodily form and character as qualify them to withstand the peculiarities of any special soil and climate. If too great and too sudden a transition be attempted the animal perishes at the outset, but otherwise it becomes year by year and generation after generation more and more completely adapted to its home with its attendant circumstances.

The variations in constitution, which under these circumstances arise, may be thus characterised:—

A constitution is *strong* when the functions of the animal system can be discharged in a healthy manner under trying variations of food and climate.

A constitution is *sound* when the animal grows and thrives under the variations commonly found in a state of nature.

A constitution becomes *delicate* when, through the intervention of man, and by a diminution of exposure, certain tendencies are fostered at the sacrifice of vital energies, so that the animal becomes specially subject to disease, and particularly so if restored to its original state of nature. The strength of constitution, for which our mountain sheep are remarkable, may therefore be traced to the fact that by natural laws they have, under trying circumstances, attained a healthy development of body which has not been interfered with by the refinements of ordinary agricultural practice.

Mountain sheep are also remarkable for being *good breeders*, and having *a good supply of milk*. Circumstances which promote health of body are at the same time equally favourable to the exercise of the reproductive powers; consequently animals noted for constitutional strength are also remarkable for being good breeders. There is also an intimate connexion between the reproductive organs and the mammary glands by which the milk is secreted. If the former act in a healthy and vigorous manner, so also do the latter, provided that a sufficient and proper supply of food be given. The three qualifications—constitutional strength,

active breeding powers, and capabilities for yielding milk, may therefore be described as clearly traceable to the fact that these mountain sheep continue to maintain their natural formation, and no material improvement or artificial treatment has been attempted with reference to them.

Another peculiarity possessed by all our mountain sheep is *the excellent quality of their meat.* In this respect they hold an undisputed pre-eminence, for no mutton surpasses it, neither does any equal it, unless produced under somewhat similar circumstances. The quality of meat depends upon the lean portion being tender and charged with a rich juice, and these results can only be obtained from an animal of mature age, of active habits, and fed upon a short sweet herbage. By activity of body the muscles are brought into exercise and a healthy growth is the consequence. The food being short and sweet, compels the sheep to take plenty of exercise to gather their supplies, and the herbage being sweet and nutritious, in contra-distinction to that which is coarse and immature, renders the meat savoury, the gravy dark and rich, and the meat palatable and digestible. These points are too much overlooked in our ordinary processes of feeding cattle and sheep, which, not less on account of their age than the nature of the food supplied to them, must furnish flesh of a totally different character from that of mountain sheep. Indeed, the rapidity of growth for which the improved breeds of sheep are remarkable is by no means a characteristic of mountain sheep. Of this the cause is obvious. The shortness of the herbage and the steepness of the pasturage are unsuited to any but small and active sheep, accustomed to travel long distances, over rough and rugged ground, to gather their supply of food; whereas under such circumstances some sheep would be more exhausted by the labour of getting food than benefited by its consumption.

The growth of wool is also materially influenced by climate and soil; the natural tendency to produce kempy-haired fleeces being just in proportion to the quantity of rain, the severity of the climate, and the poverty of the soil. This, it is true, may by good management be kept in check, and to such an extent that, in spite of all difficulties, the wool produced on some farms will be found to be superior to that of other lands more favourably situated; this, however, only shows how much may be done by man's industry, and does not detract from the general force of the natural tendency. Indeed, it should be remembered that the natural coating of the sheep varies, according to climate and other circumstances, from being purely hair to being purely wool. In India, Tartary, China, and other parts of the world sheep are to be met with covered entirely with hair, and we can

trace every intermediate stage from this condition to the finest qualities of wool. Zornlin gives the following interesting illustration of this change from wool to hair :—

"As an instance we may mention that the fleece of the sheep is liable to variations according to the temperature of the region in which it is placed. The sheep originally transported to the New World was a variety with coarse rough wool. A remarkable change is observable in the fleece of the race (descended from those sheep) which now inhabits some of the warm valleys of South America. The lambs possess the woolly fleece, but if left unshorn this coarse wool falls off and leaves a short glossy and compact hair. In some parts of the same region the cows also, instead of having rough hair similar to that of horned cattle of temperate zones, have their skins as bare as the Barbary dog."

There is nothing therefore in the structure of our sheep which necessarily renders them wool-bearing animals, independent of the circumstances under which they are placed. Hair and wool are both produced from very minute vascular bulbs situated beneath the epidermis or outer skin: these, on examination, have the appearance of a number of holes, but are really so many tubes passing through the skin and terminating in small bulbs or follicles, in and around which nourishment is supplied by means of the blood vessels. In these follicles there is no essential difference whether wool or hair be produced; the result is solely determined by the circumstances and conditions of life. Rapidity of growth is primarily dependent upon the nutriment conveyed to these bulbs. If an animal be fed liberally the blood becomes enriched thereby, and every part of the body participates in the store of nutriment distributed throughout the system. A liberal dietary therefore tends to promote, and poor scanty food to check, the growth of wool. Moreover, the even growth of wool depends upon the animal being regularly supplied with food; and unevenness in wool is accompanied by a tendency to break at that portion of the fibre which was produced whilst the animal was feeding on inferior food. Mountain sheep are very subject to such changes, from plenty to scarcity, with all the attendant evil consequences; but the discredit of this should fall on the flock-owner rather than on the flock. The growth of wool is further influenced by the state of the skin, which in a well fed sheep is soft and oily to the touch, and has a tendency to encourage a softness of wool which is most desirable.

The size or fineness of wool is in a similar manner influenced by that of the pores of the skin through which it has to pass. In warm weather the pores are more open and the wool is of a stronger character than when the pores are contracted by the cold. To equalise the size of the fibre any extreme of heat on the one hand, or of cold on the other, ought as much as possible to be avoided. This is another cause of the unequal

character of the wool of mountain sheep, arising from circumstances of soil and climate, quite independent of the breed. To diminish the influence of cold, various means are adopted; of these the process of salving the sheep and the use of coarse cloth covers are the more general, both aiming to preserve warmth and softness of skin, and thereby to encourage the more equal development of the fleece. It is true, very opposite opinions are entertained by flock-masters as to the advantages of *salving*; but it will be evident that in proportion as the skin is maintained in a soft and warm condition, by a liberal—or at any rate a sufficient—supply of food, so the necessity for supplying to the wool what must really be equivalent to an artificial yolk becomes less necessary, and therefore it may readily be imagined that under good management the practice of salving does not become as needful as when the flock have to contend with greater hardships.

The quality of the wool also depends in a great measure upon the roughness of its edges. Those edges when examined under the microscope show a serrated or sawlike formation, and the felting capability of wool is entirely dependent upon the number of those projecting points. The wool of sheep which are much exposed to heavy rain is usually deficient in this character, and assumes the form of kemp-hair, doubtless a provision of nature for rapidly throwing off the water from the body. The production of good wool is therefore promoted by giving sheep liberal and regular supplies of food, and by protecting them from any excessive severities of climate. For these reasons the wool of our hill sheep offers a striking contrast to that produced by the mountain breed—the superiority of quality and the increase of quantity being clearly traceable to a steady adherence to those rules under which alone good wool can be produced. At the same time it is only fair to remark that any attempt to produce heavy fleeces upon sheep intended for the active and laborious life of grazing mountain pasturage, would render them unfit for such a duty.

The evidence of flockmasters receives in this and many other respects a clear and definite solution. The character and constitutional development of sheep determine the districts for which they are best adapted, and these points of character are clearly under our control. We find in the sheep of our mountain districts most desirable qualifications, which they possess in an unparalleled degree, viz., healthy constitutions, active breeding powers, good supplies of milk, and meat of the best quality; while their external form, which we are too apt to condemn, is essential to their constitutional strength under the severities of the climate to which they are exposed. By altering the external

form we necessarily modify the internal organisation; the lungs and the liver are rendered smaller and less active, and the fatty matter of the blood, being less perfectly burnt off in the body, is stored away as fat; but just in the same degree do we limit the power of that animal to maintain its natural heat, a certain amount of which is absolutely necessary for the healthy action of the animal system. If, therefore, an animal be placed in a climate so severe that this warmth of the body cannot be maintained, either from the diminished activity of the lungs or the inadequacy of the food supplied, the body becomes unhealthy for lack of heat. Our mountain sheep are so constituted that they can, with a proper supply of food, be kept upon these elevated pastures with great advantage; and were they discarded, we have no other breed capable of enduring the same rigour of climate when living upon the same herbage. If any important improvement should be introduced into the ordinary system of mountain farming, the mountain sheep must still be the basis of any flock which is likely to be remunerative to the occupiers of those elevated grazing lands, and for these reasons our mountain sheep must be preserved in all their native strength and purity.

On all but strictly mountain farms in a state of nature, cross-breeding will most effectually promote improvement. Pure bred mountain ewes are often driven into more favoured districts, where the climate is more equable, the crops more abundant, and the labour of securing the supply of food very much reduced. Under such circumstances we may, by cross-breeding, readily impart to their offspring a greater rapidity of growth, and at the same time an aptitude for fattening and for the production of a good fleece. This is often done in the mountain districts when the ewes have been drafted for sale. They are crossed with a superior ram, and thereby they become more marketable. This will be most satisfactorily accomplished, not by the rams of any one breed, but by a selection of rams from the most improved sheep upon the eastern boundary of each portion of our mountain district. Thus the black-faced mountain sheep of Westmorland will be most improved by superior Cheviot rams, the Welsh mountain sheep by good Shropshire Downs and Ryeland rams, and the sheep of Exmoor and Dartmoor by the use of the Notts and Leicester. This is the natural and practical system of cross-breeding from mountain ewes, and one very generally adopted; not that it is the only system of cross-breeding by which the desired result may be obtained, but the evidence of experience is clearly in favour of this natural arrangement.

The reason, why these rough ewes produce lambs which equal in quality the produce of more valuable ewes, demands

some comment, and I refer to it with the greater pleasure because it points to the key-stone of successful cross-breeding. We will assume that we have a flock of rough mountain ewes, and we want to produce a class of sheep which can be sent away for feeding upon better land, and under a more favourable climate, and which must not only possess a hardy character, but also be valuable for producing mutton and wool. For such a purpose we must find a ram having the qualities which the ewes do not possess, or, in other words, the ram must be well bred, with a strong aptitude for the formation of flesh, fat, and wool. The ewes possessing hardy constitutions, being good breeders and excellent nurses, will bring those qualities to perfection which are imparted by the ram, and thus the combined result will be satisfactory. It may be inquired whether the same ram would not have produced better lambs if bred with superior ewes. That entirely depends upon the points in which these latter ewes are superior; if, as will be generally understood by the term, we mean ewes of higher feeding powers and better fleeces, and consequently less active breeding powers, then I anticipate that the produce of the rough mountain ewes will be the more profitable. Stronger and more healthy lambs would be produced; they would be better nourished by such ewes; and from the ram there would be an uninterrupted transmission of the strong tendency possessed by him for the formation of meat and wool. This rule is not confined to sheep. I have already given instances of the same results with both cattle and pigs, and I believe it will be found to occur almost invariably. The most perfect cross-bred animal that can be produced will result from a female possessing the best constitution, most active breeding powers, and a tendency to produce a good supply of milk, crossed with a male distinguished for good pedigree and representing a high development of those qualities desired in the offspring. The one has strength of hereditary power which enables it to convey the desired character to the offspring, and the other is fully competent to carry out its full development.

It may be truly and justly remarked by those whose herds and flocks occasion them anxiety and losses,—in consequence of their weak and delicate constitutions, or from the difficulty experienced in breeding from them with regularity, and also from the natural supply of milk being deficient—that they cannot all breed from mountain sheep nor their immediate descendants, and therefore the evidence advanced does not meet their cases. I would, however, submit on the other hand that it has been proved * that all these difficulties arise from an irregular and injudicious course of

* 'Journal of Royal Agricultural Society,' vol i. p. 262, second series.

management, and I have now endeavoured to show that under a more natural system of treatment such difficulties may be avoided. Such being the fact, the man of judgment will at once detect, by an examination of his course of management, what is the cause of the trouble and loss he has to contend with, and thus he will be able to guard against their recurrence by modifying his procedure, so as to maintain his stock in the highest state of health and excellence of which the peculiarities of the soil and climate of his neighbourhood will admit.

V.—*A Short History of the Rise and Progress of the Devon Breed of Cattle.* By J. Tanner Davy.

Prize Essay.

The origin of most communities is necessarily obscure; it is, therefore, not to be wondered at that the fragments of history on which the origin of a particular breed of cattle rests are somewhat shadowy and uncertain. We learn from the early history of our country that invading armies frequently compelled the inhabitants to retreat with their flocks and herds into the wild mountainous districts of Wales and the west of England, thus preserving their lives and property and the source from which those breeds constituting the "middle-horned variety" are supposed to be descended. Writers on cattle divide them into three varieties: the "Short-horned," originally found in the northern and eastern counties; the "Middle-horned," in the western part of England, in Wales, Scotland, and Sussex; and the "Long-horned," in the midland counties and in Ireland; all agreeing that the "Middle-horned," of which the Devons form one variety, are descendants of the aboriginal breed of Great Britain. From the earliest records the Devons can be traced as the peculiar breed of the county from which they take their name, and of that portion of West Somerset adjoining it, where from time immemorial they have reigned alone, clad in beautiful red curly coats well suited to the cold, damp climate of their hill country. In his work on Cattle, Mr. Youatt says:—

"The slightest observation will convince us that the cattle in Devonshire, Wales, and Scotland are essentially the same. They are middle-horned, tolerable but not extraordinary milkers, and remarkable rather for the *quality* than the *quantity* of their milk; active at work, with an unequalled aptitude to fatten. They have all the characteristics of the same breed, changed by soil, climate, and time. We may almost trace the colour, namely, the *red* of the *Devon*, the Sussex, and the Hereford; and even where the black alone are now found the memory of the red prevails, and has a kind of superstitious reverence attached to it in the legends of the country. In many parts of Scotland, and in some of the mountains of Wales, the milk of the *red cow* is con-

sidered to be a remedy for every disease, and a preservative from evil. Every one who has had an opportunity of comparing the Devon cattle with the wild breed in Chillingham Park, in Northumberland, has been struck with the great resemblance in many points, notwithstanding the difference in colour, while the wild cattle bear no likeness at all to those of the surrounding country."

Again, speaking of skulls of cattle found in various parts of England, he says :—

"There is a fine specimen in the British Museum; the peculiarity of the *horns* will be observed, resembling smaller ones dug up in the mines of Cornwall, and preserved in some degree in the wild cattle in Chillingham Park, and not quite lost in our native breeds of Devon and Sussex, and those of the Welsh mountains and the Highlands."

Persons in the habit of visiting our show-yards must see that there is still a similarity between the Devon, Hereford, Scotch, and Sussex cattle, particularly the former and the latter; indeed, it is so great that an inexperienced observer would fail to detect any material difference, especially when we notice how much the Sussex cattle resemble in the crescent-shaped, turned-up horn and heavy eye, as well as in size and shape, those Devons bred about Taunton, particularly before they had been so much mixed with North Devon bulls.

A great difference is perceptible in animals of the same breed. Large breeds and bulky varieties of the same are co-extensive with a warm climate and rich pasturage, whilst smaller breeds and their varieties are met with in colder and poorer districts. In proof of this, attention may be directed to the larger class of Devons, with long straight hair, bred in the fertile Vale of Taunton Deane, as compared with those bred among the hills of North Devon, so noted for their rich curly coats, which they frequently lose after a change of pasturage to a richer and warmer district, but which desirable appendage cattle brought from a distance frequently acquire by the end of the autumn after having been summered on those hill pastures.

Unquestionably, the original seat of the Devon breed was in the district bounded by the river Taw on the west, extending from Barnstaple to about the point where the South Molton Railway station is now situated, from thence to Bampton, Wiveliscombe, Taunton, then turning towards Williton and on to the Bristol Channel, which forms its northern boundary. Some would probably confine it within narrower limits, but it is necessary to approach this subject truthfully, without prejudice or partiality for any particular variety. Mr. Shillabear, the agent for the present Earl of Leicester, states that it was towards the close of the last or the commencement of the present century that the late Lord Leicester (who was a very good judge of stock) became a purchaser not only of Devon steers for working,

but also of the best males and females for breeding purposes, and, as is well known, he soon established a valuable herd. In this example he was followed about the same time by Mr. Talbot, of Temple Guiting, Gloucestershire, and by Mr. Childe, of Kinlet Hall, in Shropshire, all of whom exercised sound judgment in their selections in Devonshire and in their after-management of the cattle at home. Some years after this (about 1830), Mr. Childe (whom the late Mr. William Davy, of Flitton, considered, *as a purchaser*, the best judge of Devons he ever met with) bought Prize (108), one of the best stock-getters the Quartlys ever bred, whose offspring gave as much satisfaction in Shropshire as it had previously given at home. A grandson of his, bred by Mr. Talbot, of Temple Guiting, won the gold medal at the Smithfield Show in 1838, having been purchased in Northampton fair by the late Mr. Clerk Hillyard, who offered, sometime in the summer previous, to show him against any ox in England. Unhappily, Mr. Childe's splendid herd were sold and dispersed at his death, which occurred a few years afterwards.

Vancouver, treating of Devon cattle in his 'Report of the Farming of Devonshire,' published in 1808, says, "They are an important breed of animals, active at work, and their aptitude to fatten is unrivalled;" but further states "they were then declining in their general standard of excellence and numbers," which he traces to "the great demand made for them from other parts of England, where the purchasers (Mr. Coke, afterwards Earl of Leicester, and others) spare neither pains nor price to obtain those of the highest proof and beauty." Towards the close of the last century some of the country gentlemen who farmed and the majority of the most influential yeomen bred, superior, hardy, handsome Devons, possessing great aptitude to fatten, consequently such animals were plentiful, and could be frequently purchased at ordinary rates (say from 15*l*. to 20*l*.) in the local fairs and markets; while the highest price for the service of the best bulls did not exceed 5*s*. However, we must not quite forget that at that time the demand being chiefly local, nearly, if not *all*, farm stock found its way into the public market or fair for sale; whereas now there is a great private demand for good animals of all descriptions, and numbers of the most valuable are sold by private contract to customers who come to the homestead, and thus are rarely seen by the general public except at sales or in a show-yard. A little later many were tempted by the excessively high prices offered (during our wars with America and France) to sell even their best cows or heifers at great prices for slaughter, their fattening propensity being so great that then, as at present, even milch cows were in the

autumn almost always fit for the butcher. At this time also purchasers from a distance carried off many of the choicest animals, at what were then thought enormous prices, to found new herds in other counties. Many, who had sold the greater part of their best cattle, were next attracted by the high price of corn; consequently sheep, turnip husbandry, and corn-growing became necessary and important. As in a state of domestication all animals are subject to man's will and control, it follows that they will naturally degenerate unless sound judgment be exercised in breeding them. In the absence of this precaution during the time just alluded to, a class of inferior stock sprung up where those of a superior kind had previously existed. Fortunately there were several spirited exceptions to this rule, of men who were justly proud and fond of their native breed, and who would not be tempted by high war prices and by other offers to part with their best, but retained and handed them down to their descendants, in whose possession in many instances they still remain. Among these were the Messrs. Quartly of Molland, Davys of Rose Ash and North Molton, Merson and Michael Thorne of North Molton, Tapp and Buckingham of Twitchen, Mogridge and the Halses of Molland, and others. Seeing what was taking place, that the best animals were being killed for beef, or bought and carried out of the district, the late Mr. Francis Quartly sometimes outbid the butchers in order to obtain a very superior beast possessing the qualifications he thought most important (or to replace one he considered inferior); thus he picked out the trumps from many hands, and by breeding from and intermingling them with his own, he brought the Champson herd to great perfection. Cattle shows were not then generally established, so that there were few, if any, opportunities of testing the relative merits of the several herds. Soon afterwards one was established at Torrington, and about 1831 the Devon Agricultural Society was founded at Exeter, followed by others at Barnstaple, Taunton, &c., all holding annual exhibitions, affording the public opportunities of comparing well bred symmetrical animals with those more generally kept. The undeniable fact that the former met with a more ready sale, and commanded higher prices, caused many to take an interest in and desire to possess some of the old blood, and to purchase or avail themselves of the services of superior bulls at an almost nominal charge, say of 5*s.*, or even less: and thus in time to assist in increasing the number of better class animals and restoring the Devons to their former pre-eminence.

Since then railways and steamships have helped to bring out sales, giving increased facilities to purchasers from all parts of the world; while the publication of the 'Herd-Book' has tended

to establish an interchange of minds among breeders, and to fix attention to different sorts of blood; so that the Devons, instead of being confined as formerly to their native county and West Somerset, have been conveyed to new homes at the Royal Farms near Windsor, to many counties in the United Kingdom, to Mexico, Jamaica, Canada, Australia, France, and the United States of America, where there are many valuable herds doing well, as the following extract from a letter from Mr. Daniel Steinmetz, of Pennsylvania, written last year, proves. He says, "Devon cattle are thriving in America; they are a profitable breed, and withstand changes of soil and temperature well." In their original strongholds they have been largely kept by *tenant farmers* from time immemorial, clearly proving that they are a good *rent-paying* breed, especially in cold hilly districts, where more bulky animals would fare badly; they rapidly outstrip most others when kept on rich land, and experience proves that they will flourish anywhere under proper treatment. If any are bold enough to state that the progeny do not maintain the high character of their parents for symmetry and quality in any particular district, let them ask themselves whether the deterioration (if it exist) be not mainly attributable to their own ignorance of the true principles of breeding, and a lack of knowledge to select the male by which any particular female will be likely to produce the most valuable offspring. It is only by a thorough knowledge of those laws and their proper application that we can ever hope to improve, or even to maintain, any kind of stock in a state of excellence. It does not necessarily follow that well-bred females will produce really first class offspring, unless they are put to those males best suited to them in character, form, and quality. The generality of farmers should confine their attention to the production of beef, leaving bull-breeding to those few who possess capital, skill, and the powers of observation so indispensable to a successful prosecution of this difficult and precarious department of business. Some people think that the Devons generally were larger 30 or 40 years ago, and instance the dairy of cows which the late Mr. Michael Thorne once turned into North Molton fair: that the latter were gay-headed, upstanding, useful animals no one can deny; at the same time it is asserted by good judges who can remember them, that they were deficient in those extra rich symmetrical "gems" which have since won our Royal Agricultural Prizes, and in that high *quality*, perfect symmetry, and *depth of frame*, now to be met with in our best dairies. It was not uncommon in those days to allow heifers to attain, and sometimes to exceed, the age of 4 years before calving; thus their growth was unchecked: at present, partly from the necessity of bringing them into pay earlier, and

partly from the difficulty occasionally experienced in breeding from older animals, they are allowed to calve at 3, sometimes at $2\frac{1}{2}$ years old: in the latter case, without attention and good keep, the frame will be smaller and the growth of the horn checked, depriving the animals of their otherwise grand and imposing appearance. It is impossible that such immature creatures can stand this unnatural drain without damage, and probably if the practice be systematically pursued, as well as that of breeding extensively from *very young* bulls, the general hardihood of the race will become impaired and their size reduced. Many reasons exist why Devon breeders are seldom exhibitors at Smithfield or Birmingham Fat Stock Shows; they know it is useless to send any but a perfect animal to either, and having such a large demand for bulls, the best, and indeed nearly all the bull-calves, are reared for that purpose, and good cows are bred from up to an age when they would be too old to exhibit. Moreover, their farms are more adapted for breeding than for feeding purposes, with which exhibiting at fat stock shows might seriously interfere.

Splendid specimens are, however, often sent from the Royal, the Earl of Leicester's, Lord Portman's, and Mr. Farthing's farms; and very fine animals bred by Messrs. Mogridge, Davy, Quartly, Passmore, Tapp, Turner, and others, are exhibited by gentlemen who have purchased and fed them. Landowners might assist in improving the breed of stock generally, and confer a great benefit on their tenantry, by purchasing and keeping a good two or three year-old bull, where the tenantry and neighbours might if they chose avail themselves of his services at a moderate charge; in this way the bull would more than earn his keep. If the plan were pretty generally adopted the improved condition of farm-stock would in a very few years bear testimony to the soundness of this assertion. Many will remember that for some years after Messrs. Bult and Bond brought the bull Hundred Guineas (56) into the neighbourhood of Taunton, on going into the local markets, one could not fail to recognise steers and heifers got by him, by their superior quality and symmetery. The prizes offered by the Torrington Agricultural Society in West Devon have led to the introduction of many well-bred bulls into that neighbourhood, and the importance of this fact will appear when we consider the immense number of cattle reared in and sent by dealers from North and West Devon, and Cornwall, for sale at Bridgewater, Bristol, and Banbury markets, from which those remaining unsold go on to Northampton weekly markets, where they are usually bought by graziers and dealers who attend it from the counties of Buckingham, Bedford, Cambridge, Leicester, and Northampton. Cattle from Bratton, Crediton, and South

Molton autumn fairs are sent to Barnet, on the 4th of September, whilst those from North Molton and Bampton October fairs go on to Blackwater in Hampshire, for the 8th of November; and, if unsold, from thence to Kingston-on-Thames, on the 13th. Most of the heifers are sent into Somersetshire and Dorsetshire to be fattened, to which districts also a great many yearlings from North Molton May fair and from the neighbourhood are annually sent.

The "South Hams Breed" to be met with in South Devon are quite a distinct variety, and appear to have been at some time crossed with the Guernsey. They are said to be good milkers, possessing large frames, coarse bones, and an immense quantity of offal. Luckily the land on which they are fattened is rich, and after a time they make great weights, having large internal accumulations of fat, an excess of which is the farmer's loss and the butcher's gain: but their flesh, which consists more of the fourpenny and less of the ninepenny beef, is decidedly inferior to that of the North Devon. Nevertheless they have several warm advocates among tenant farmers in South Devon, who say that they are fairly remunerative. It is to be regretted that, whilst retaining their milking properties, no endeavour appears to be made to convert their wedgelike shape into a nearer resemblance to a parallelogram, together with a tendency to lay on beef in the most valuable parts.

From the earliest times the true Devon colour has been *red*, varying from a dark to a lighter or almost chestnut shade, which in summer often becomes beautifully mottled with darker spots. Twenty or thirty years ago those of the lighter colour were more plentiful than at present; they are often of the richest quality, though perhaps less hardy than those of a little darker shade. The hair of very dark-coated animals is wiry and the skin hard and coarse: indicative of less aptitude to fatten and of inferior quality of flesh. Extremes should be avoided, viz., delicacy of constitution on the one hand and coarseness on the other; those of a middle shade being on the whole the most serviceable. Devon breeders strongly object to white; undoubtedly, an animal without any is preferable, though it would be unwise to reject one, perfect in all other respects, if the white be confined to the udder only. Black or mottled noses are almost unknown, and certainly consign their possessors to the butcher's stall for veal. Judging from the rude state of agriculture (until within say the last 150 years), it is not improbable that our ancestors (who required their cattle for beef only) were less fastidious than we are, and probably did not object to breed from an animal with a dark muzzle or a little white on the skin, if it came up to their standard as a meat-producer.

Devons were formerly much sought after for their activity,

worked up to five years old, and then fattened; but ox-labour has been found unequal to the present system of husbandry. It is undeniably true that, until a comparatively recent period, the existence and reputation of the Devon breed was chiefly sustained by yeomen who could not afford to give each other the almost fabulous prices which are paid for short-horns; and, owing to the isolation of the county and the difficulty of communication with their native district more particularly, they had not become so fashionable. The 'Herd-Book,' however, proves that since that time each succeeding year secures fresh adherents and admirers among noblemen and extensive landowners. Previous to its publication Devon breeders spoke of their best animals by some distinguishing name (often that of the donor of a prize it had won, as, for instance, the bull Sillifant was so called after Mr. Sillifant, who first gave the prize for a bull yearling at Exeter), or it referred to any accidental circumstance connected with its career, thus enabling themselves and their neighbours to indicate and recognise any particular beast alluded to. Strangers, however, found this more difficult: therefore Captain Davy, of Rose Ash,* observing the deficiency, and thinking they deserved to have their pedigrees recorded and that it would assist the public in tracing out different sorts of blood, compiled and published the first volume of the 'Devon Herd-Book.' in time for distribution at the Royal Agricultural Show at Windsor in 1851. It contained the entries of 132 bulls and 483 cows, alphabetically arranged and numbered separately for the sake of distinction and reference. From the accuracy with which the pedigrees of these beasts were preserved by their owners and handed down to their successors, a larger number could have been added and the whole traced to a more remote period: but it was thought sufficient to include those only, and trace their parentage to others, which the majority of living persons interested could easily identify. Among the earliest was Prize (108), calved about 1819, bred by Mr. Quartly, and sold to Mr. Childe, of Kinlet; Forester (46), also bred by Mr. Quartly in 1827, and his great grand-sire, bred by the late Mr. J. T. Davy, of Rose Ash; Oxford (89), bred in 1836 by the late Mr. W. Davy, of Flitton, who gained the first prize at the Royal Agricultural Meeting at Oxford; Cambridge (12) and Sillifant (120) were well remembered. The fourth volume, bringing up the number of bulls to 768, and females to 2474, was published in 1863; and the fifth volume, bringing pedigrees down to the present time, is in course of compilation.

It is pretty generally understood that other families have

* The author of this Essay.—Ed.

been Devon breeders as long as the Quartlys; but it cannot be denied that the late Mr. Francis Quartly, of Champson in Molland, by purchasing the best he could obtain and breeding them with his own, was very instrumental in bringing the race to perfection, and in the latter part of his career received valuable aid from his nephews, Messrs. John and James Quartly, in successfully exhibiting them in the early days of Cattle-shows. In the summer of 1850 the public, to mark their value of his services as a breeder, presented him with a full-length portrait of himself, standing by the side of Cherry (66) and her calf. Persons, whose memory only carries them back to the period during which Devonshire has had the advantages of railway communication, can hardly imagine the impediments which a resident in the north part of it had to encounter in sending stock for exhibition even to the County Society's Show, where the journey to and from Exeter occupied two days each way,—as much time as is now required to send them from one end of England to another, but then also accompanied with greater risk and trouble. Whilst private donors offered handsome premiums, the majority given by the Society were comparatively small; this, combined with the distance and other obstacles, probably prevented breeders in remote parts from exhibiting so largely and frequently as they would have done under more favourable circumstances. Some few availed themselves frequently of the chance of exhibiting, but the greater number preferred avoiding the trouble, risk, and expense, and more especially the time it took them and their servants away from home; for the practice of exhibiting stock with trained feeders and attendants was then unknown.

It will be found, on reference to the 'Herd-Book,' that many of the prize Devon bulls can be traced back to Forester (46), proving what is stated in his pedigree, "that he was a very celebrated bull." He was bred by Mr. Quartly in 1827, by a great-grandson of Prize (108), before mentioned as having been sold to Mr. Childe, of Kinlet. Mr. Quartly also bred his dam, but her grandsire was bred by the late Mr. J. T. Davy, of Rose Ash. It has already been stated that before the publication of the 'Herd-Book' animals were often named from some circumstance connected with their career: thus Forester was so called from his having been sold to the late Mr. Knight to run with heifers on the Forest of Exmoor, where he remained some time. At length Mr. Quartly discovered the mistake he had made in selling such a valuable stock-getter, and was highly delighted when, after some trouble, he succeeded in re-purchasing him, more prize animals being descended from him than from any other bull. Among them was Mr. F. Quartly's great

favourite, Curly (92), whom he esteemed with her mother, Long-horned Curly, two of the best cows he ever bred. Curly gained a first prize at the Devon Agricultural Show at Exeter, and was the mother of the first prize bull Hundred Guinea (56), and the first prize cow Pretty Maid (366) at the Royal Agricultural Show at Bristol; also of Rosebud (402), winner of the second prize as an in-calf heifer at Lewes; Duchess of Chester (1299), and a host of other first prize animals. Sillifant (120), (so named from his having obtained a prize offered by Mr. Sillifant at the Devon Show), was a grandson of Forester (46). In 1836 Mr. Quartly relinquished business, had a sale, and was succeeded at Great Champson in Molland by his nephew Mr. John Quartly, with whom he resided until his death on the 23rd of July, 1856, aged ninety-two. Mr. John Quartly writes, "Great Champson, the farm I now rent of Sir N. W. Trockmorton, Bart., has been in the occupation of my forefathers, my uncle, and myself, for one hundred and seventy years; and I believe the cattle now on the farm are of the same breed as those at the beginning of that time. At my uncle's sale, in 1836, I bought one bull-calf, six cows, five heifers, and two heifer-calves." Among these were two of the cows before-mentioned, viz., Pretty Maid (366), and her mother Curly (92), who in 1837 bred Mr. John Quartly the far-famed bull Hundred Guinea (56); he was purchased in 1840 by Messrs. J. S. Bult and Bond (near Taunton), for what was then thought an extraordinary price for a Devon bull, viz., one hundred guineas, and was ever after known by that name. He gained the first prize at the Devon Agricultural Show as a yearling in 1838; at the next Show in 1839 the first prize as an old bull; a silver cup at Taunton in 1840; the first prize in Class 1 at the Royal Agricultural Show at Bristol in 1842; and the first at Tiverton in 1844. His sire was Sillifant (120). When he was located in the Vale of Taunton Deane he first added superior quality and symmetry to the *size* of beasts kept in that district, from which many of his progeny found their way into the prize-lists of the Royal, Smithfield, and other Shows. Mr. John Quartly bred the Earl of Exeter (38), also descended from Curly (92), and Forester (46), who was the winner of the following Royal Agricultural prizes, viz. second at Exeter in 1850, and first at Windsor in 1851; the Duke of Chester (404), winner of the first prize at Chester, and afterwards sold to Viscount Falmouth; Frank Quartly (205), sold to Colonel Morris, of New York, where he gained first prizes at the State Show and at the American Institute in 1853; and Sultan (318), a Royal prize bull, are all descended on *both* sides from Curly (92) and Forester (46). Handsome (2043), Lovely (2150), Playful (354), all Royal winners, claim the same descent. The late Mr. Henry

Quartly (brother of Francis) died at West Molland in 1840; at his sale, which took place soon afterwards, his son, Mr. James Quartly, purchased about twenty bulls, cows, and heifers, having previously bought Sillifant (120) at his uncle Frank's sale in 1836. Of the many Royal Agricultural and other first-prize bulls bred by Mr. James Quartly, the following can be traced on *both sides* to Forester (46) and to Curly (92), viz., Baronet (6), Quartly's Prince of Wales (105), Emperor (41), Napoleon (259), Warrior (548), King of the Bretons (659), and Lord Kerry (664). Among the prize females are Bracelet (43), Rosebud (402), Dolly Varden (142), Moss-Rose (903), first at Carlisle; Duchess of Chester (1299), first at Chester and at Warwick. And on one side, the Duke of Devonshire (35), first in Class 2 at Exeter; Duke of York (57), first in Class 2 at York in 1848, and first at Exeter in 1850; Sylph (434), second at Lewes; Princess (379), and a host of others.

The late Prince Consort first established a herd of Devons in 1856 from those of Messrs. Turner, Farthing, Mogridge, and Quartly; the prize-lists of the Royal, Smithfield, Birmingham, and other Agricultural Societies testify how judiciously the managers of that herd have bred animals combining the extra quality and symmetry of the North Devon with the size of the Somersetshire Devon. The Royal stock were first entered in the third volume of the 'Herd-Book' in 1859. Zouave (556), who had such a splendid back and loins and claims descent from Forester (46), gained the first Royal Agricultural prize at Chelmsford in 1856, and a second in Class 1 at Chester. A son of his, the Colonel (387), gained the first prize at Carlisle as a bull-calf, and at Chelmsford as a yearling; his grandson, Prince Alfred (709), gained first prizes at Battersea as a calf and at Worcester as a yearling. Prince Alfred's own sister, the Rose of Denmark (3019), gained the first prize as a calf at Worcester, and as a 2 years and 11 months-old heifer at Plymouth; both combinations of Quartly's and Farthing's blood. At Mr. John Quartly's sale, in 1860, Peace and Plenty (935) and Dairymaid (1264) were added to the Royal herd. The former was in-calf by Napoleon (259), and produced Crown Prince (604), the first prize yearling bull at the Royal Show at Battersea.

The Davy family have bred choice Devons for the last 150 years; they know that John Davy, who died at Rose Ash in 1790, aged 84, always bred them; at his death the herd was divided between two of his sons, the late Mr. John Tanner Davy, who inherited his property at Rose Ash, and William, who had the leasehold property of Flitton Barton in North Molton. The elder brother, John, had always a noted herd, and, after the establishment of local Agricultural Societies, he gained many prizes

at Exeter and Barnstaple, particularly with his favourite cow Flower, and her family. He was compelled by ill health to relinquish farming in 1842, soon after the Royal Agricultural Society was established, or in all probability he would have been a successful exhibitor. He bred the grandsire of Tulip (451), dam of the celebrated bull Forester (46), proving that in early days no jealous Show-yard feeling existed among breeders; but living near, and knowing one another well, they bought, sold, and worked from each other's bulls without reserve, their aim being to improve the general symmetry, quality, and flesh-points of their beasts. The late Mr. Thomas, of Rose Ash, very successfully exhibited many animals bred by, or immediately descended from, Mr. J. T. Davy's herd; among them the first-prize bull at Exeter, Lopes (64), and the celebrated prize cow Taunton (440), calved in 1837; and gained a silver cup at Taunton in 1840, at Exeter as the best breeding cow, and in 1841 at Taunton as the best cow and offspring; her daughter Birthday (38), who gained the first prize as a cow at the Devon Show at Exeter, also at Barnstaple, was afterwards sold to Colonel Morris of New York, and there laid the foundation of a family of Devons which are highly prized. Mr. Davy died in 1852, and was succeeded by his son Captain Davy, the Editor of the 'Devon Herd-Book,' who bred among others Mayboy (249), also of Forester descent, the winner of many prizes in the United States; also Richmond (292), a Bath and West of England winner. The herd of the late Mr. William Davy, of Flitton Barton, North Molton, combined size, quality, and good milking properties; previous to his death, about 1840, he gained a number of prizes at the Devon Show at Exeter and at the North Devon Show at Barnstaple; since then the successes of his son Mr. James Davy, at the Royal Shows, at the Taunton, at the Devon Show at Exeter, at the Bath and West of England, and at Barnstaple, are well known; and are doubtless attributable to the unprejudiced manner in which he has occasionally availed himself of opportunities of infusing fresh but *equally* pure blood (which is a *sine quâ non*), thus avoiding the evils of breeding in and in too closely. This, however, is approaching disputed ground, and it is undesirable to pursue the subject further. The Flitton herd gained its first laurels in the early days of the Royal Society's shows, viz., at Oxford, where Oxford (89), who had been previously sold to Mr. Paull, gained the first prize. He was a son of Forester (46), and on the dam's side was solely descended from prize cows bred by the late Mr. Davy. A yearling heifer gained the first prize at the Royal Agricultural Show at Bristol. Nelson (83) gained the best prize at Barnstaple, and the second at the Royal Show at Windsor. Napoleon 3rd (464) gained a prize at

the Bath and West of England Show at Newton, and the first at the Salisbury Royal; he combined Quartly blood on the side of the sire, with Davy blood on that of the dam. Eclipse (190), a first-prize bull at the Bath and West of England Show at Tiverton, was of similar descent, and was sold to Charles Sturgeon, Esq., for transmission to Australia. At the Royal Show at Battersea, the Society offered, in addition to the ordinary prizes, two gold medals—one for the best male Devon in any of the classes, and the other for the best female. Mr. James Davy won both, with Duke of Flitton (613), and Temptress (1672). In dealing with this herd, it is only fair to quote the unprejudiced report of the Stewards of Stock at Battersea. At p. 379, 'Royal Agricultural Journal,' Vol. XXIII., it is stated, "The Devons are the best I have ever seen, and I have attended eleven Royal meetings; the cows, heifers, and yearling heifers especially, were very superior. Mr. James Davy, of Flitton, sent five animals; and won four firsts and a second (against one of his own), besides taking both gold medals with the Duke of Flitton (613), and Temptress (1672)." Princess Alice (2283), the first prize yearling, who had previously won the first prize as a calf at Leeds, was drawn out with Temptress for the gold medal.

Further on, the Report says, "Two such yearlings as Mr. Davy's Princess Alice and Young Empress (2448) have been seldom seen in one man's possession." Since 1862 Mr. Davy has only exhibited at the Royal Show at Plymouth, where his bull Duke of Flitton the 2nd (825) gained the second prize, Empress 2nd (2669) won the first prize as a cow, his 2 years and 2 months-old heifer gained a third, and his two yearling heifers, daughters of the Duke of Flitton (613), the first and third prizes. In December, 1867, Mr. Smith of Exeter gained the first prize and a silver medal for an ox, bred by Mr. Davy, and a grandson of his gold-medal cow.

Mr. George Turner of Brampford Speke, and Bowley (late of Barton), commenced breeding in 1818, inheriting some from his father; he says, "I also purchased the best I could get from the late Mr. John Tanner Davy of Rose Ash, the Messrs. Quartly, Mr. W. Davy of Flitton, and Mr. Halse." Although Mr. Turner cannot claim to be one of the earliest Devon breeders, still by prudent selections from the best herds, skilful breeding, and exhibiting extensively, he has borne his fair share in sustaining and spreading their fame, and has been a successful competitor at the Devon, Royal, Bath and West of England, Smithfield, and Birmingham Shows, having bred the following Royal first prize bulls:—Derby (23), combining Quartly and Mogridge blood; Turner's Prince of Wales (106), of Davy and Quartly descent; Omar Pasha (473), Protection (110), of Turner and Mogridge

blood; Duke of Devon (34), a winner at Gloucester and Paris; Czar (172) at Lincoln, and the Zouave (556), who was successively shown and gained first prizes as a calf, a yearling, and an old bull at the Royal Shows. All these were descendants of Forester (46); and again two younger scions of his took first and second prizes at the Plymouth Royal Show, and 2nd and 3rd prizes at Battersea. Mr. Turner has also gained many prizes with females, exhibiting for the first time at the Royal Show at Cambridge, where his two heifers gained prizes, and a first at Derby in 1843. Hawthorn (218) and Wallflower (472), own sisters, and Ruby (405), gained prizes at Windsor; the latter also at Carlisle; and Lady (241) was a prize cow at Gloucester. Vaudine (1699), a daughter of Wallflower (472), sustained Mr. Turner's celebrity at Chester, and at the Bath and West of England Shows; Piccolomini (1540) won the 2nd prize at Battersea, of whom the stewards in their report speak as "a surpassingly good cow," every one of these claiming descent from Forester (46).

Mr. Richard Mogridge, of Cophall, Molland, is not a frequent exhibitor; but has bred many animals which in other hands have gained first prizes. He only once exhibited at Smithfield, when his heifer obtained the first prize in her class, and was the "reserved number" for the gold medal, in case the one to whom it was awarded should be disqualified. Among those which he sold to the late Prince Consort was the first prize steer at Smithfield, in 1854, own brother to his heifer. He sold Mr. Turner Abd-el-Kader (134), winner of first prizes at the Royal Shows at Gloucester and Lincoln; and bred Countess (79), the dam of Czar (172), the first prize bull calf at Lincoln. Young Forester (759), bred by him, gained the first prize at the Bath and West of England Show at Dorchester. All these giants were scions of Forester (46).

The Mersons of Brinsworthy have bred Devons for two or three generations, and a goodly array of silver cups and other trophies on their sideboard bear testimony to their frequent successes. Mr. Richard Merson bred Cambridge (12), the first-prize bull at Cambridge, one of the Royal Agricultural first-prize animals not descended from Forester (46); his Northampton (86), the first Royal winner at that place and of other prizes,* as well as his Sultan (122), who was placed second at York, and was afterwards sold to Mr. Blomfield, in Norfolk, must acknowledge their Forester descent. Northampton (86) became for a time the property of

* Northampton (86), viz., 1st at the Taunton Cattle Show, a prize at Bath, a prize at the Warwick Agricultural Show in 1850; and a prize of 10*l*. at the same show, as being the best animal exhibited for breeding purposes.

Mr. Bond, near Taunton, enabling the Somersetshire breeders to continue that improvement in the quality and symmetry of their herds, which Hundred Guinea (56) had recently introduced; he was afterwards sold to Mr. Umbers. Mr. James Merson, since the death of his brother in 1855, has fully sustained the character of this herd, as the successes of his Prince of Wales (499), winner of the first prize at the Bath and West of England Show at Cardiff and a cup at Newport, Dairymaid (1260), Lovely (1461), Stately (1656), as well as his numerous prizes gained at the Royal Shows at Newcastle, Battersea, and Plymouth fully prove.

The late Mr. Hole, of Knowle, near Dunster, bred Champion (17), a son of Hundred Guinea (56), who, after winning first prizes at Dunster, Taunton, and at the Royal Show at York, was sold to Lord Portman. His son, the present Mr. Hole, restricts himself almost entirely to Quartly blood. His Queen of the West (394) gained the first prize as a yearling at the Northampton Royal Show, and a cup at Taunton; Miss York (300), by Champion (17), gained him a first at the Royal Show at York; whilst Belle of the West (529) brought home a cup from Taunton in 1852; Rosetta (1026) and Fair Maid of Somerset (695) gained the first prize for a pair of heifers at Plymouth, and Favourite (718) brought him a prize from the Gloucester Royal; all claiming Forester descent.

Mr. W. M. Gibbs, near Taunton, gained the first prize at the Royal Shows at Norwich for his yearling bull, and a prize at Exeter for his heifer. He, with Messrs. Fouracre and Bond, for some years successfully exhibited the progeny of those two symmetrical North Devon bulls Hundred Guinea (56) and Northampton (86), mingled with their large-framed cows.

Mr. Walter Farthing, of Stowey Court, Bridgewater, says, "I can trace my herd of Devons back to my great-great-grandfather, a Mr. John Farthing, who lived at Yarford, in Kingston, near Taunton. Wonder was the first Royal winner my predecessor, the late Mr. Samuel Farthing, ever bred, and the first he ever exhibited of his own breeding at the Royal Agricultural Show, which animal laid the foundation of my best families as prize winners." Wonder (345) was the sire of many prize-takers at the Royal, Bath and West of England, and other Agricultural Societies' Shows, and in Paris; viz., Lewes (226) gained prizes at Taunton and Bath in 1850; at the Royal Show, at Taunton, Bath, and Bridgewater, in 1851; at the Lewes Royal Show in 1852, and prizes at Warwick after he was sold to Mr. Umbers; Bessie (534), the first-prize cow at the following Shows:—the Lewes Royal, the Bath and West of England, at the Taunton and Bridgewater Shows,—was by Wonder, with a mixture

of Davy's blood on the dam's side. Lovely (856), the first-prize cow at the Royal Show at Lincoln, at Plymouth, and at Bridgewater, was by Wonder, as was Punch (1001), a prize cow in Paris. Mr. Walter Farthing has gained nearly 160 prizes, which entitle him to rank as the principal Devon breeder in Somersetshire. This pre-eminence is due to his skill in freely mingling some of the purest North Devon blood with his own larger-framed animals; thus combining quality, symmetry, size, and the best specialities of different herds. His reply to the question, "Which are the two best animals, one male and one female, you ever bred?" bears out this assertion. He says, "I think Viscount (746) and Nelly (1512) the best male and female I ever bred, and the two best I ever exhibited in public as yet; the two have won for me 24 prizes." Viscount (746), who gained prizes at the Royal Shows at Leeds, Battersea, and Plymouth, at the Bath and West of England Shows at Truro and Wells, and at the Taunton and Bridgewater Shows, was a combination of Farthing's, Davy's, Quartly's, and Merson's blood, whilst Nelly (1512) was by Baronet (145), a son of Quartly's Baronet (6), out of Mr. Farthing's Punch (1001). It is still further apparent in his following Royal and Bath and West of England first-prize animal, Lord Quantock (452), Prince (277), both by Baronet (6), Colonel (594), and Duke of Leeds (618), by Sir Peregrine (722), of Quartly and Farthing blood, and claiming Forester descent. Bessie (534) combined Davy's and Farthing's blood, and Fancy (704) was a granddaughter of Mr. R. Merson's Northampton (86). He has also used the Forester bull Sir Peregrine (722), a Royal and Bath and West of England first prize winner, who, although bred by Sir Alexander Hood, is an almost pure bred Quartly, and the sire of Viscount before mentioned. Mr. Farthing bought Constitution (803) at Mr. James Merson's Sale, September 6th, 1865.

Mr. Charles Boucher and others breed useful, large-sized animals near Wiveliscombe, using North Devon bulls. His Eclipse (39), by Prince Albert (102), bred by Mr. James Quartly, gained a cup at Taunton in 1849. Mr. Boucher bred Duke (41), by Quartly's Baronet (6), and his neighbour, Mr. Elworthy, bought Elworthy (40), by President (97), of the late Mr. Richard Merson, of North Molton. Messrs. Lyddon, of Withiel Florey, and Paull, of Ilminster, adopted the same plan of getting their bulls from Devonshire. Mr. C. F. Perkins, of Kingston, near Taunton, established a herd about seven years ago, buying chiefly from Mr. Farthing, and wisely using the almost pure Quartly bull, Sir Peregrine (722).

Mr. Taylor, of Harptree Court, founded a herd of Devons about the same time, making his selections principally from

Davy, Merson, Mogridge, and Quartly, and purchasing the Gold Medal bull, Duke of Flitton (613), after the Battersea Show. He gained a first prize at the Royal Show at Plymouth for his bull-calf Profit's Duke (912), by Duke of Flitton (613), out of Profit (992), bred by Mr. Davy, and a second prize for a cow bred by Mr. Merson.

The late Earl of Leicester was one of the earliest patrons of Devon cattle from a distance. His selections were from nearly all the best Devonshire herds, and it was from Holkham that their first exportation to the United States took place. The present Earl has gained many prizes at Birmingham and Smithfield, also a second prize for his bull, Monarch (77), and the first for his cow at the Royal Show at Norwich, together with a prize for his two-years'-old bull at Lewes. Two Quartly bred bulls, Prince of Wales (105) and Napoleon (250), together with Athelstone (364), bred by Captain Davy, were used at Holkham for some time.

Mr. John Blomfield, of Warham, Norfolk, has long been a noted breeder, winning three prizes at the Royal Show at Norwich. He bought Sillifant (122), the second-prize bull at York; and in 1862 Mr. James Davy's Garibaldi (636), a son of his old favourite Palmerston (476).

Mr. A. Hammond, of West Acre, beat Mr. Blomfield in the heifer class at the Norwich Royal Show.

His Grace the Duke of Manchester gained the first prize for his bull, and the second for his cow at Northampton in 1847.

Mr. William Umbers, late of Wappenbury, Warwickshire, commenced Devon breeding in 1810, buying from Messrs. Tapp, Davy, Reynolds, and Burnell, in Devonshire, and from the late Mr. Childe, of Kinlet. He once sold a heifer for 10*d.* per lb. for the living weight; so that she realised 60 guineas. His son, Mr. Abraham Umbers, inherited his stock, and has gained many prizes; his herd now consists of three bulls, eleven milch cows, and several in-calf and younger heifers.

The late Mr. T. Umbers also gained many first prizes with his Devons, which, at his decease, became the property of Mr. S. Umbers, who has been a successful exhibitor at local shows, and gained the first prize at the Chester Royal Show with Birmingham (147), a son of Northampton (86).

It is to be regretted that Mr. John Tapp, of Twitchen, Devon (who possesses one of the oldest herds), seldom or never exhibits; few, if any, have choicer animals. He bred the first-prize bulls, Sillifant (121), and Nelson (81), which were sold to Lord Portman.

Mr. John Passmore, of Bishop's-Nympton, bred Actæon (1), by Duke (30), the second-prize old bull at the Exeter Royal

Show; and steers which, in Mr. Heath's hands, have won the highest honours at Smithfield. Both Messrs. Tapp and Passmore live near, and use Quartly's bulls.

The present Earl Fortescue, like his father, has a herd, and breeds from Messrs. Quartly, Turner, and Davy.

Mr. Hole, of Hannaford, near Barnstaple, has bred many prize animals. Among them Zemindar, the Canterbury second-prize calf, and the third-prize bull at Battersea; Rosetta (1026) and Camilla (563), prize heifers at the Bath and West of England Show, and Isis, the reserved number at the Battersea Show.

Mr. Bodley, of Stockley Pomeroy, has gained several prizes at the Devon County, and the Bath and West of England Shows. At the Royal Show at Plymouth he took the third prize with his yearling bull, Lincoln, by Champion (588a), and the following prizes offered by the Local Committee, viz., the first for a pair of two-year-old heifers, the second for a pair of yearling heifers, and a second for a pair of bull-calves. His bull Perfection (688) took the first prize at the Royal Show at Leeds. He objects to fatten females for exhibition.

J. H. Buller, Esq., of Downes, gained a second prize for his two-year-old bull at the Royal Show at Plymouth; first prizes for his yearling bull and for his in-calf heifer at the Bath and West of England at Wells, and his father, the late J. W. Buller, Esq., M.P., took the first prize for his heifer at the Bath and West of England Show at Exeter in 1863.

Mr. Amos Parsons, of Black Torrington, a breeder, of over thirty years' standing, from Davy, Merson, and Quartly, has gained prizes at the Royal Cornwall, Lifton, and Tavistock Shows. His bull Waldo (333), by Earl of Exeter (38), gained first prizes at Stratton and Holsworthy; his cow Buttercup (558), by Earl of Exeter (38), out of Mr. J. Davy's Duchess (673), took prizes at the last-mentioned place; whilst Homely (781) and Vellacott (1103) were also winners at Holsworthy.

Mr. W. Northey, of Lifton, breeds from Davy and Quartly, and has been successful at local shows.

About the year 1845 or 1846, the late Mr. Webber, of Halberton Court, purchased Hundred Guinea (56) of Messrs. Bult and Bond to work with his herd, which gained many local prizes. At his death his brother, Mr. T. Webber, succeeded to the farm and herd, and has gained the following prizes at the Bath and West of England Shows: viz., at Taunton, in 1852, with Magnet (232); at Tiverton, in 1855, with General Havelock (420), by a bull bred by Mr. Davy; at Yeovil and at Cardiff with Prince Albert (490); and at Tiverton with Jenny Lind (1413), who also gained a second prize at the Royal Show at Lincoln; and with Nelly (1514) at the Taunton Show in

1856, and at the Bath and West of England Show at Newton in 1857. This herd is bred from the late Mr. Gibbs, of Cothelstone, near Taunton, Mr. Davy, of Rose Ash, and Mr. J. Quartly, of Molland: another successful example of a judicious mixture of the Somerset and North Devon varieties.

Mr. T. Wilkinson, of Chawton, Isle of Wight, bought Magnificent (68) of Mr. James Davy, a prize bull at the Barnstaple Show, and used Sultan (122) whilst he was the property of the late Hon. Dudley Pelham.

In Cornwall, the late Mr. Tremayne, of Heligan, near St. Austell, and the late Dr. Rodd, of Trebartha, appear to have been the earliest breeders of note from Quartly, Merson, and Davy. For the last twenty years Mr. Tremayne's late agent, Mr. Samuel Anstey, near Fowey, and rather more recently Mr Palmer, of Stoke Climsland, have bred Devons, chiefly from the brothers Quartly. The former bought Protection (111) of Mr. John Quartly, and gained the first prize with him at the Royal Cornwall Show in 1850; and with a son of the Earl of Exeter (38), Uncle Tom (328), he gained the first prize at the Royal Cornwall Show at Truro. Mr. Palmer bought Lord Kerry (664), the first-prize bull at the Canterbury Royal Show, Warrior (548), and President (698), of Mr. James Quartly: all of these being descendants of Mr. F. Quartly's Curly and of Forester (46).

Mr. Sobey, residing near Liskeard, after several local successes, gained the first prize at the Royal Agricultural Meeting at Plymouth with a scion of Forester and Curly, viz., Sobieski (728), a son of the Duke of Chester.

Mr. James Tremaine is now using the gold-medal bull Duke of Flitton (613); so that since 1860 Cornishmen have purchased four Royal first-prize bulls,—Warrior (548), Duke of Chester (404), Lord Kerry (664), and the Duke of Flitton (613); Mr. Sobey owning another in Sobieski (728).

The Rev. A. C. Thynne, near Stratton, in 1860 purchased Prince Pen (699), a son of Warrior (548), Duchess (1938), Fancy (1968), and Hebe (2057), a first prize winner at Stratton in 1862, of Mr. Northey; and in 1862 Red-deer (2313*a*), a daughter of the gold-medal cow Temptress, of Mr. Davy.

Viscount Falmouth's first purchases were at a sale of Mr. Tremayne's. He afterwards bought the Duke of Chester (404) at Mr. John Quartly's sale, together with cows and heifers from Quartly and Turner. His Lordship gained the first prize offered by the Local Committee at the Royal Show at Plymouth for the best pair of heifers, with Lily Bell (2829) and Bonnie Lass (2527) the latter a daughter of the Duke of Chester (404).

Lord Portman's herd (originally bred and from time to time

recruited from Messrs. Davy, Tapp, Dee, Merson, and Quartly) and its successes for very many years are well known. He bought Nelson (81), bred by Mr. John Tapp in 1840, and Champion (17), Mr. Hole's first-prize bull at the Royal Meeting at York. His Lordship bred the first-prize two-years-old heifer, at the Battersea Royal Show, Young Hebe (2450), exhibited by Mr. Paull, near Dorchester; she had previously gained the first prize at the Wells Meeting of the Bath and West of England Society, at which show Mr. Paull gained the second prize with another of Palmerston's daughters, bred by Lord Portman. At the same show Mr. J. A. Smith, near Dorchester, exhibited and gained the first prize with a cow by Palmerston (476), bred by Lord Portman, and the third prize with Curly (97) when 14 years old, which was the dam of Napoleon III. (464), the first-prize bull at Salisbury. Mr. Smith wisely bought first-class animals to commence with, and during his short career as a Devon breeder has been fairly successful. In consequence of Mr. E. Pope's death, his herd, which numbered many prize-takers, has been recently sold.

Mr. R. B. Warren's first entries were in the third volume of the 'Herd-Book.' He purchased the three bulls, Doctor (400), Little John (488), and Robin Hood (509), of Mr. R. Mogridge, of Molland: his females are from Lord Portman, Davy, Quartly, and a few by Mr. Farthing's Baronet (145).

Mr. Miller, near Sherborne, possesses prize-takers, but has not yet entered his stock in the 'Herd-Book.'

Charles Hambro, Esq., of Milton Abbey, near Blandford, first appears in the fourth volume of the 'Herd-Book,' and gained the first prize for an in-calf heifer, Lina, at the Bath and West of England Show at Exeter, and the second prize for his 2 years and 8 months old heifer Miss Portman (bred by Lord Portman) at the Royal Show at Newcastle-on-Tyne in 1864.

The Earl of Eldon's Devons first appear in the fourth volume, commencing with Lucknow (670), bred by his Lordship; by General Havelock (420), bred by Mr. Webber, of Halberton, Devon, together with three females from Mr. Farthing; and the bull Cæsar (798), bred by Mr. Bodley.

Two or three years ago his Grace the Duke of Northumberland, of Sion House, Middlesex, commenced Devon breeding, and has purchased altogether one bull and six females from Mr. J. Davy, of Flitton.

Miss Rose, of Mullamore, county Monaghan, Ireland, has two bulls and three females entered in the fourth volume of the 'Herd-Book,' viz., Duke II. (710), bred by Mr. P. Halse, of Molland; Duke (183); and Pickwick, bred by Mr. Mogridge [by King of the Bretons (659)], who also bred two of the females,

and Mr. Halse the third. Major Gasson, of Ballinclough, county Tipperary, and Major Barry Fox, also breed Devons.

To particularise every herd in the United Kingdom would be an almost endless task, so numerous have they become of late years. The older and more distinguished breeders and their various triumphs having been already noticed, it is only necessary to add to the list Cecil Smith, Esq., of Lydiard House, near Taunton, and his father, who have gained many prizes; together with the Marquis of Anglesea, near Lichfield; the Earl Beauchamp and Sir T. Boughey, in Worcestershire; W. Morris, Esq., Governor of the Dartmoor Convict Prison; Messrs. Stubbs, of Perry Barr, near Birmingham; Thomas Julyan, St. Creed, Cornwall; Loveband and Baker, of Bishop's-Nympton; Dr. Risdon, of Dolton; Messrs. W. and J. Perry, of Thrushelton; Shapland, of North Molton; Jackman, of Lawhitton, Cornwall; John Snow, of Braunton; William Andrew, of East Putford; Haynes, of Hartland; Trix, of South Molton; Corner, of Torweston; and Nurcombe, of Dunster, Somerset; the Rev. A. Morgan, of Newport, Monmouthshire; Messrs. Brooks and Coles, of Yeovil, Somerset; and the Rev. S. N. Kingdon, of Bridgerule.

The first recorded exportation of pure-bred Devons to America took place in 1817, and was thus narrated in a letter from Mr. G. Patterson, of Maryland, to Mr. Richard Peters, of Atlanta, by him communicated to Captain Davy, and published in his Preface to the second volume of the 'Herd-Book:'—

"Sykesville, Maryland, Sept. 3rd, 1853.

DEAR SIR,—Your letter of the 29th August has been received. In 1817, Mr. Coke (afterwards Earl of Leicester), of Holkham, England, gave my brother, Robert Patterson, six Devon heifers and a yearling Devon bull, named by Mr. Coke, Taurus. My brother gave three of the heifers to his father-in-law, Richard Caton; the other three he gave to my father, William Patterson; the bull Taurus was the joint property of Caton and my father. Two of the heifers belonging to my father were in calf by a bull of Mr. Coke's, the third heifer was put to Taurus upon their arrival in this country. The three afterwards were bred to Taurus, and the progeny of the whole were bred together. In 1835, after the death of my father, I became possessed of his stock of Devon cattle descended from Taurus, the three heifers above mentioned, and the calves of the two heifers which were in calf before leaving England. Taurus was bred by Mr. Denny, a tenant of Mr. Coke's. Mr. Coke gave fifty guineas for Taurus. In 1820 I saw the dam of Taurus on the farm of Mr. Denny: she made thirteen pounds of butter a-week. In 1835 I wrote to the Earl of Leicester that I owned the Devon cattle descended from the stock he had given my brother some years before, and that I was anxious to procure a bull for a cross. He sent me out Anchises, and wrote to me that he had bought him from one of the best dairies in Devonshire for his own use.

(Signed) G. PATTERSON.

Mr. Peters, of Atlanta, Georgia, tried Short-horns and Devons,

but sold the former, finding the latter better suited to warm climates. He purchased many animals of Mr. G. Patterson, and in 1854 imported Raglan (286) and Novice (931) from Captain Davy, and Placid (961) from the late Mr. Thomas, of Rose Ash, Devon. In 1851 Mr. Ambrose Stevens, of New York, imported several animals from England; among them Candy (153), bred by Mr. James Davy, and Washington (130), bred by Mr. Quartly. In the same year Colonel Morris, of Mount Fordham, New York, imported Frank Quartly (205) (who gained prizes in America), a son of the Earl of Exeter (38) and Curly (96), and a worthy descendant of Forester (46) and Mr. Frank Quartly's favourite cow Curly): also Princess (380), from Mr. James Quartly, and Birthday (38), who gained two first prizes in England. In 1853 Mr. E. G. Faile, of West Farms, New York, imported Exeter (198) and Victoria (1108), both from Mr. James Quartly; Victoria gained the first prize at the American Institute: from Mr. G. Turner he had Jenny (790) and Virginia (1116), also Cleopatra (582) and Titania (1084), both of whom gained first prizes at the New York State Show, at the American Institute, and at the United States Agricultural Show. In the same year, Mr. G. Vail, of Troy, imported May Boy (249) from Capt. Davy, of Rose Ash, and gained with him the first prize at the New York State Fair at Saratoga. Mr. Wainwright, of The Meadows, Rhinebeck, New York, was a pupil of Mr. Turner, at Barton, near Exeter, and purchased his Omar Pasha (473), winner of the first prize as a yearling at the Royal Show at Carlisle, and the only Royal first-prize bull that has crossed the Atlantic. From Mr. Baker, of Bishop's-Nympton, Devon, he had previously imported Meguntícook (251), who gained the two first prizes in his adopted country, and Kate Kearney (811) the second prize yearling at the Lewes Royal. Nonpareil (924), bred by Mr. Halse, of Molland, Devon, gained the first prize as a heifer at Barnstaple, before Mr. Wainwright bought her, and subsequently a first prize at the New York Show. Helena (774) became a great favourite of Mr. Wainwright's.

In 1857 Mr. Linsley, of West Meridan, Connecticut, purchased Duke of Sussex (406) of Mr. John Quartly; Empress Eugénie (1308), the Salisbury Royal first-prize yearling, Lofty (1456), Jessie Davy (1418), and also 5 heifers, from Mr. G. Turner. The first volume of the 'Herd-Book' contains no entries from America, but in the second volume, which was republished in the United States, are entries from Messrs. L. T. Allen, of Buffalo; E. P. Beck, of Sheldon; W. Garbut, of Wheatland; T. Gould, of Aurora; L. G. Morris, of Mount Fordham; Ambrose Stevens, R. H. Van Rensalear, and C. P. Wainwright, all of the State of New York; A. Bideman and C. P. Holcomb, of

Delaware; S. Hurlburt, of Connecticut; G. Patterson, of Maryland; R. Peters, of Georgia; W. R. Sanford, of Vermont; and Farmer, of Canada West. In the fourth volume the following additional owners registered their stock:—G. S. Brown, the Hon. A. B. Conger, Hon. Ezra Cornell, Arthur Gillman, Col. Hole, of West Farms, State of New York; Hon. John Wentworth, of Illinois; Mr. J. F. Anderson, of Maine; Linsley, of Connecticut; J. H. M'Henry, of Maryland; and Mr. D. Steinmetz, of Pennsylvania, who lately wrote thus to the editor of the 'Herd-Book':—"I find North Devon cattle the most profitable breed in America; I can raise more valuable beef on them with the same amount of food than any other breed." Through Mr. Fowler, Mr. J. Davy has sent Devons to Jamaica, and 2 bulls and 2 heifers to Mexico; and Messrs. Quartly, Davy, Turner, Merson, and Farthing, have sent them to Ireland, Canada, and Australia. The Duke of Cornwall (33), Prince of Wales (106), Volunteer (128), and Napoleon (80), and several females, were purchased some years ago for the French Government; and in 1862 M. De la Chapelle, Bruères, près St. Arnaud, département du Cher, France, bought Mr. Davy's second-prize yearling heifer Young Empress at the Battersea Royal Show; also Rachel (2306), Lady Mary (2125), and Rosebud (2330), of the late Mr. E. Pope, of Great Toller, Dorset.

In the course of this essay stress has been more than once laid on the marked improvement in quality and symmetry of the large-framed Somersetshire Devons produced by the use of the best and neatest North Devon bulls, and this view was borne out by the late Mr. Henry Cline, in his 'Observations on the Breeding and Form of Domesticated Animals.' At page 8, he says:—

> "When the male is much larger than the female, the offspring is generally of an imperfect form. If the female be proportionally larger than the male, the offspring is of an improved form. The proper method of improving the form of animals consists in selecting a well-formed female, proportionally larger than the male. The improvement depends on this principle: that the power of the female to supply her offspring with nourishment is in proportion to her size, and to the power of nourishing herself from the excellence of her constitution."

The Devon breed having thus been traced from the earliest period, when their existence was scarcely known beyond the then remote county from which they derive their name, and it having been shown how a small band of farmers, justly proud of their native breed, by their own exertions sustained its purity, and carried it triumphantly through a very critical period—until at length its own intrinsic merits attracted the attention at first of a few discriminating judges, and finally of the general public,

leading to their introduction into various parts of Great Britain and Ireland, France, Jamaica, Mexico, Australia, Tasmania, Canada, and, lastly and largely, into the United States of America —it were easy to enlarge upon their valuable qualities, but the writer has confined himself to an impartial history of the breed, whose native home is a bleak hilly district several hundred feet above the sea-level.* Flourishing as they do there, it is not surprising that they maintain their reputation when transplanted to richer soil and a milder climate.

VI.—*Chemical Report.* By Dr. Augustus Voelcker. Presented to the Council December 2nd.

I have the satisfaction of reporting to the Chemical Committee that the members of the Society availed themselves more frequently during the past year than in any previous year of their privilege of sending samples of manures, soils, cakes, &c., to the laboratory. The number of analyses made in 1868 amounts to 432, and exceeds that of 1867 by 91, being larger than the total number of analyses recorded in any previous year.

This increase in the analytical work for members of the Society probably is mainly due to the brisk transactions in artificial manures which took place in the past season, and the scarcity of food, in consequence of which a large number of artificial manures, principally of the character of superphosphates, and many oil-cakes and feeding materials, were sent to the laboratory for analysis.

By far the larger proportion of the class of manures to which superphosphate belongs were found of good quality, well prepared, and worth the money at which they were offered for sale. Of late years the manufacture of superphosphate has much improved, and notwithstanding its superior quality and intrinsic value, the market-price of this description of fertilisers has not been increased. On the other hand, Peruvian guano of high quality continues to be scarce, and several samples were found to be grossly adulterated.

Compound artificial manures, sold under the name of British guano, corn-manure, &c., as a rule were found too dear at the

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* Where within the memory of many now living

"The mighty stag at noontide lay:"

and still when the chilly autumnal blasts from the Atlantic sweep across the moorland, not only the cattle, but

"The sheep, before the pinching heaven,
To sheltered dale and down are driven."—J. T. D.

price at which they were offered for sale. Most of the compound manures analysed might be readily obtained by the farmer, at a much cheaper rate than they are sold, by mixing together in certain proportions well-known manuring matters, such as guano, sulphate of ammonia, dissolved bones, salt, &c.; but if he prefers to buy the mixture ready made, he is strongly recommended to have the manures analysed, and to have ascertained whether the intrinsic value of the fertilising constituents of the compound manure corresponds with the price at which it is offered for sale.

Sulphate of ammonia has been largely used in the past season, and with good effects both for wheat and grass crops. The demand for sulphate of ammonia, moreover, has greatly increased of late, it having been found remarkably efficacious for sugar-cane, and for the cultivation of beet-root on the continent.

In consequence of the exportation of sulphate of ammonia to the sugar-growing colonies, and to the beet-root districts in the north of Germany, the price has gone up from 12*l.* 10*s.* to 17*l.* a ton, and with it the price of all ammoniacal and nitrogenous manuring matters has risen considerably of late. There is, therefore, no probability that Peruvian guano will become cheaper, the chances being that it will go up, if its quality continues to remain pretty constant.

Damaged Peruvian guano is eagerly bought up by dealers in artificial manures at its full market value, and afterwards frequently mixed with some kind or other of phosphatic material, and again sold at a good profit under an assumed name, such as Coral Island guano, phosphatic guano, South Sea guano, &c. Although such mixed natural guanos may be used with advantage as manures, especially for root-crops, upon which they often have a more beneficial effect than genuine Peruvian guano, it is, nevertheless, not to the benefit of the consumer to encourage this species of adulteration.

The coprolite beds of Suffolk and Cambridgeshire are gradually becoming exhausted or too expensive to work, and the quality of coprolites has become of late somewhat deteriorated. Whilst there is every prospect of the coprolite beds in England becoming practically exhausted at no very distant period, it is satisfactory to find that new sources of supply of phosphatic minerals are constantly being discovered.

Large quantities of Sombro rock phosphate and Navassa guano, and the more recently discovered phosphorite in the valley of the Lahn, in Nassau, and some cargoes of Spanish and Canadian apatite, now find their way into England, and no fear need be entertained that British agriculture will suffer from want of the principal raw materials from which superphosphate and

similar artificial manures are manufactured, or that the price of such manures will be raised in the approaching season.

On account of the great importance of these phosphatic mineral deposits, I took an opportunity last summer to visit the Nassau phosphorite mines, and was struck with the great extent of country over which these mines are spread. At the time of my visit new shafts were sunk in every direction, and the phosphatic deposit has now been found all along the valley of the Lahn. In the immediate neighbourhood of Limburg, the place where the phosphate was first discovered, the deposit was still worked; but more extensive deposits have recently been discovered at Dehrn, and in the neighbourhood of Wetzlar. Unfortunately a large proportion of the Nassau phosphate is much impregnated with oxide of iron, a constituent which is objectionable in the production of soluble phosphate of lime. On an average the better importations of German phosphate into England yield from 60 to 65 per cent. of phosphate of lime, and though this is not a high percentage, yet the comparatively low price at which this mineral is sold renders it a useful material to the manufacturer of artificial manures.

Nassau phosphate of a very superior quality, containing barely 30 per cent. of phosphate of lime, I was informed when travelling last summer in Germany, has been used in that country in a finely ground state, without having been previously treated with sulphuric acid. When applied to the land in large quantities, this mineral, like chalk-marl, no doubt will benefit the crops grown upon the land to some extent, but it appears to me very questionable whether the application of a merely powdered very poor mineral phosphate can be carried out with advantage to the farmer beyond a reasonable distance from the locality where it occurs.

With respect to feeding substances, I would observe that the great scarcity of green food and the failure of the root-crops have compelled farmers to become purchasers of oil-cakes and corn to a much larger extent than in ordinary years.

In consequence of the increased demand of purchased food, the sophistication of oil-cakes, I regret to say, has received a great impetus. I hardly remember any season in which I had to examine so many inferior and adulterated linseed-cakes as in the past. The subject deserves the most serious consideration of the agriculturist, for the buyer of adulterated oil-cakes generally is not only defrauded by paying high prices for inferior feeding materials, but occasionally he runs the risk of endangering the health of his stock by giving them adulterated oil-cakes, inasmuch as those who deal in such cakes, from want of knowledge and cupidity, occasionally incorporate with feeding cakes substances which are positively poisonous to animals.

I have already reported on the admixture of castor-oil beans, and the still more poisonous curcas bean, both of which I found last season in several samples of linseed-cake, and may add that not unfrequently almost any kind of rubbish, such as mill-dust, siftings of seeds, spoiled cakes, ground rice-husks, &c., when ready at hand, is deemed good enough by unscrupulous oil-cake makers for the production of feeding-cakes. The audacity of some makers in palming off adulterated linseed-cake as pure would hardly be credited, if it were not a fact that more than one linseed-cake sent to me for analysis, and bearing the press stamp "pure," proved to be mixed or adulterated with a variety of feeding materials, such as cotton-cake, earthnut-cake, bran, and rice-dust.

The mention of rice-dust reminds me of a case brought under my notice a short time ago, in which the refuse-meal did serious mischief to a number of pigs to which it was given. The analysis of the meal in question showed that it was contaminated with about 4 per cent. of nitre: a salt which, taken in large doses internally, has a powerful medicinal effect upon animals. In all probability the contamination of the meal with saltpetre was caused by damage in a heavy sea, as if a cargo of saltpetre and rice sustains damage by sea-water, the latter most likely would become impregnated with a solution of nitre, and the damaged rice, on being dried and ground into meal, will contain this non-volatile salt.

On the occasion of a tour on the Continent last summer, I attended the annual Congress of Agricultural Chemists of Germany, which met this year at the Royal Agricultural College of Hohenheim in Würtemberg, and was much struck by meeting with nearly fifty scientific men, who, in different parts of Germany, are all engaged specially in chemico-agricultural pursuits. Many of them preside over laboratories, to which some experimental fields, feeding-stalls, and glass-houses, are attached, and in which every facility is provided for carrying on scientific agricultural inquiries. These establishments are called on the Continent Versuchs-Stationen (Experimental Stations). The results of the labours of the German agricultural chemists are published in a Quarterly Journal, containing much useful theoretical information, which deserves to be more generally known in England than it is.

In 1868 I contributed to the 'Journal of the Royal Agricultural Society of England' the following papers:—1. On the Solubility of Phosphatic Materials, with special reference to the Practical Efficacy of the various forms in which Bones are used in Agriculture. 2. On the Composition and Nutritive Value of Trifolium striatum, a new kind of Clover. 3. On the

Causes of the Benefits of Clover as a Preparatory Crop for Wheat.

With the sanction of the Chemical Committee, I set on foot, as in previous years, a number of field-experiments on—1. Root-crops—Mangolds, Swedes, Carrots. 2. On Potatoes. 3. On Artificial Grasses. 4. On Permanent Pasture.

The following printed list was forwarded to a number of agriculturists residing in different parts of the country, mostly former pupils of mine:—

Experiments.

Field Experiments on Roots: Mangolds, Swedes, Turnips, and Carrots.—The following experiments are recommended with a view of ascertaining what is the best root-manure on different soils; each plot to be one-twentieth of an acre:—

Plot.					
1.	No manure.				
2.	Mineral superphosphate	16½ lbs., or at the rate of		3 cwt. per acre.	
3.	Mineral superphosphate	16½ lbs.	,,	3	,,
	Potash salts	11 lbs.	,,	2	,,
4.	Mineral superphosphate	16½ lbs.	,,	3	,,
	Peruvian guano	5½ lbs.	,,	1	,,
5.	Peruvian guano	16½ lbs.	,,	3	,,
6.	No manure.				
7.	Mineral superphosphate	16½ lbs.	,,	3	,,
	Potash salts	11 lbs.	,,	2	,,
	Sulphate of ammonia	5½ lbs.	,,	1	,,
8.	Rotten dung	1 ton	,,	20 tons per acre.	
9.	Mineral superphosphate	16½ lbs.	,,	3 cwt. per acre.	
	Potash	11 lbs.	,,	2	,,
	Nitrate of soda	5½ lbs.	,,	1	,,
10.	Rotten dung	½ ton	,,	10 tons per acre.	
	Mineral superphosphate ..	8¼ lbs.	,,	1½ cwt. per acre.	
11.	Bone dust	16½ lbs.	,,	3	,,
	Mineral superphosphate ..	8¼ lbs.	,,	1½	,,
12.	No manure.				

Samples of the experimental fields were desired to be sent to Dr. Voelcker, 11, Salisbury-square, Fleet-street, London, E.C.

Field Experiments on Potatoes.—The following experiments are specially recommended on light soils; each plot to be one-twentieth of an acre:—

Plot.					
1.	No manure.				
2.	Mineral superphosphate	22 lbs., or at the rate of		4 cwt. per acre.	
	Crude potash salts	11 lbs.	,,	2	,,
	Sulphate of ammonia	11 lbs.	,,	2	,,
3.	Good rotten dung	1 ton	,,	20 tons per acre.	

Plot.			
4.	Mineral superphosphate	22 lbs., or at the rate of	4 cwt. per acre.
	Crude potash salts	22 lbs. ,,	1 ,,
5.	No manure.		
6.	Mineral superphosphate	22 lbs. ,,	4 ,,
	Crude potash salts	11 lbs. ,,	2 ,,
	Nitrate of soda	11 lbs. ,,	2 ,,
7.	Peruvian guano	22 lbs. ,,	4 ,,
8.	Mineral superphosphate	22 lbs. ,,	4 ,,
	Common salt	22 lbs. ,,	4 ,,
9.	Good rotten dung	1 ton ,,	20 tons per acre.
10.	No manure.		

The artificials should be first mixed with ashes, burnt clay, or dry earth, and then dug in, or ploughed in, quite early in spring, when the dung is put on the land, and when the potatoes are planted.

Experiments on Artificial Grasses.—Each plot to be one-twentieth of an acre:—

Plot.		
1.	Nitrate of soda..	22 lbs.
2.	Sulphate of ammonia	22 lbs.
3.	Mineral superphosphate (dissolved coprolites)	22 lbs.
4.	Common salt	22 lbs.
5.	No manure.	
6.	Muriate of potash	22 lbs.
7.	Sulphate of potash	22 lbs.
8.	Sulphate of lime	56 lbs.
9.	Mineral superphosphate	22 lbs.
	Nitrate of soda..	22 lbs.
10.	Mineral superphosphate	22 lbs.
	Muriate of potash	22 lbs.
11.	No manure.	

The manures should be applied not later than the end of February, and the first crop, as well as the aftermath, be weighed green. The produce of each plot should be weighed directly it is cut.

Experiments on Permanent Pastures.—Each plot to be one-tenth of an acre:—

Plot.		
1.	Quick-lime	10 bushels.
2.	Quick-lime	10 bushels
	Common salt	56 lbs.
3.	Fine bone dust	$1\frac{1}{2}$ cwt.
4.	Mineral superphosphate	56 lbs.
	Crude potash salts	56 lbs.
5.	No manure.	

Plot.		
6.	Common salt	56 lbs.
7.	Peruvian guano	56 lbs.
8.	Crude potash salts	56 lbs.
9.	Mineral superphosphate	56 lbs.
	Peruvian guano	56 lbs.
10.	No manure.	

The effect of the manures should be observed for at least four successive seasons. The experimental acre should be hurdled off from the rest of the pasture-field, and the whole produce be carried off and weighed every year, and not be fed off by stock.

The long-continued drought in the past season, I regret to say, spoiled almost completely all the experiments on root-crops, carried out with considerable expense and much painstaking labour. Favourable reports, however, have been received of experiments on potatoes, artificial grasses, and permanent pasture. The experiments on permanent pasture were less favourable, and require to be watched and continued for a number of succeeding years before any legitimate conclusions can be drawn from them.

The experiments on artificial grasses, on the whole, are confirmatory of similar ones made in previous years; they bring out strongly the beneficial effects which a mixture of salts of potash and superphosphate produces on seeds grown on poor light sandy soils, and show the inefficacy of potash for seeds, and, I may add, for nearly all crops on land in a high state of cultivation, and on soils containing a fair proportion of clay.

The accumulated results obtained in different counties of England are sufficiently numerous to warrant the publication of a paper, which I hope to prepare for the next volume of the Journal.

Analyses made for the Members of the Royal Agricultural Society, December, 1867, *to December*, 1868.—Guano (natural), 33; artificial guano and similar compounds, 32: superphosphates, 91; bone-dust, 18; refuse manures, 22; nitrate of soda and sulphate of ammonia, 17; marls, limestones, and other minerals, 22; soils, 18; oil-cakes, 102; feeding meals, grains, and other vegetable productions, 32; water, 36; milk, 5; examinations for poisons, 4. Total, 432.

AUGUSTUS E. VOELCKER.

Laboratory, 11, *Salisbury-square, Fleet-street, E.C., Dec.*, 1868.

VII.—*The Best Mode of Providing a Continuous Succession of Green Crops, including Roots, &c.* By R. L. Everett.

Prize Essay.

The subject about to be discussed is eminently practical, and must have often occupied the attention of all farmers in its relation to the land they till. Stock, more especially in recent years, has been the most paying element of the farm. The farmer's success has consequently largely depended on the amount of stock his land has been able to carry, and much careful thought has been bestowed upon the means of obtaining the largest possible yield of vegetable food. The system which our thought and experience have led us to adopt appears to us to possess the double merit of providing a constant succession of green crops, and at the same time of bringing out the utmost productive powers of the land; the abundant supply of herbage enabling the largest possible amount of stock to be kept, and swelling the profits of the farm in this particular branch whilst largely increasing the general fertility of the farm and adding pleasantly to the receipts from corn.

Confining ourselves to arable land exclusively—for such we understand to be the only legitimate scope of this essay—we, at the very outset, feel embarrassed by three difficulties:—1st. There is a difficulty of climate; 2nd. That of rotation; and 3rd. That arising from the widely-different kinds of stock for which provision may be required.

In regard to *climate*, it will at once be evident to any one practically acquainted with different parts of this island that what is possible and expedient in the warmer counties will often be unsuitable in those which are colder; plants which thrive well in one not being adapted for the other. A course of double cropping, which will be possible in average seasons in the south, will but rarely be practicable in the north; consequently, no rule can be laid down which will be found suitable in all places. And so with respect to *rotations*. The arrangement of green crops must be made to agree with the general system adopted on the farm, and thus the plan suitable for the four-course system will require some modification when applied to a rotation extending over a longer period.

The *kind of stock* for which provision is to be made must also modify any prescribed course of cropping. Some farmers prefer sheep, and some neat stock; some are breeders, while others graze, or unite the two systems, or keep principally dairy stock. We are encouraged, however, by the thought that if we

can point out what is best in a certain climate and with a certain course of cropping, it will not be difficult for any experienced farmer to adapt such system to the peculiarities of his own particular occupation. We wish it to be distinctly understood that we call that system the best which unites the most abundant production possible to the land with the provision of a "continuous succession" of green crops; and further, that we recommend nothing which either entrenches upon the usual breadth of corn or which prejudicially interferes with its production.

We propose to deal with the four-course system, as being that most widely followed, and, as we believe, on the whole the best for most occupations, whilst it is also the system with which personally we are most practically acquainted. In respect to climate, the eastern counties will be our guide. It is in Suffolk that we are now pursuing the practices we are about to recommend.

It will be necessary for us to deal separately with light soils and those of a heavier texture, as what is suitable for the former is often quite unsuitable for the latter. We will illustrate the systems we advocate on either description of soil with an example of 200 acres of land, all arable.

Light Soils.

First, then, we start with 200 acres of light, tender soil, with either sand or gravel as the subsoil. Let us visit this farm in July, and, supposing it to have been managed as we recommend, the respective shifts will then be occupied as follows, viz.:—

50 acres with wheat.

50 acres with roots, thus apportioned: 20 acres beet after rye; 26 acres swedes after trifolium; 4 acres tares, followed with late common turnips.

50 acres with barley.

50 acres with clover and peas, viz., 25 acres red clover, with a little rye-grass; 5 acres mixed layer (white clover, trefoil, and rye-grass); 20 acres early peas.

We will now describe the management of this farm for the ensuing year in so far as the green crops are concerned.

The peas, being of an early kind, will be fit to "make up" in July. This operation must not be delayed till the peas are ripe, or some will be lost by "shelling out" in the necessary handling of them. Immediately the peas have been "made up" they will be moved by hand into rows, while the intermediate land is ploughed and 2 pecks per acre of mustard seed is sown broadcast and harrowed in. This being completed, the peas will be shifted on to the newly-sown ground, while the land they have

been lying on is also ploughed and sown. Thus the mustard will get the earliest possible start, which in a dry season is an object of very great importance, as in such a season the greatest pinch of feed will be when the layers are fed bare and the mustard is not ready to begin. It will be found that the peas will "make" quite well on the fresh-ploughed land, and that no appreciable injury will be done to the mustard in carting them off. Some people prefer to cart the peas, as soon as they are cut, on to an old layer or a pasture to let them "make" there; but this entails rather more labour.

It will be sufficient to deal thus promptly with about 6 acres first. If the rest of the peas are not then ready to cart, proceed to deal similarly with 4 acres more. As soon as the peas are carted, sow another 4 acres, and on the remaining 6 acres sow coleseed instead of mustard. A fitting succession of feed will then be provided. We have seen a good crop of common turnips grown after peas; but it is but rarely that turnips will mature in time to allow of the land being planted with wheat. Mustard will come to feed the most quickly of any plant we are acquainted with; it is usually ready in about six weeks from the time of sowing. It has the additional recommendation of being a remarkably healthy plant to feed off, and an excellent preparation for wheat. For the information of those unaccustomed to the use of mustard, we may say that it is best not to begin feeding it off until it begins to bloom. By that time it will often attain the height of 3 feet, and will keep running and blooming till it reaches another foot higher, and during all this time it is excellent food for sheep. A friend of ours this year mowed his mustard, and carried it home to cut into chaff with straw, as food for neat stock, and he was very pleased with the result of his experiment.

As soon as harvest is finished, work must be commenced on the wheat-stubbles. We should recommend that about 20 acres be ploughed and sown with rye, which makes the earliest spring-feed of any similar plant. On 26 acres—the grass having been first forked out—trifolium should be sown. For this crop ploughing will not be necessary, the seed thriving best when sown right on to the stubble. If the seed can be obtained in the "cosh" (that is, still encased in the husk it grows in), it will be the most sure to grow. Sow this broadcast on the land, at the rate of about a 4-bushel sack to an acre (equal to 2 pecks of clean seed), and harrow it well in. If the land is too hard to admit of sufficient mould being raised to cover the seed, it will be best to use the cleaned seed and to drill it, harrowing well before and after. In a wet season the seed is sure to grow; but in a very dry season, unless it is covered, it is apt to be sprouted

by the dew, and then to be dried up and to perish, under the influence of the sun and wind, before it has obtained a rooting in the soil.

We have now disposed of 46 acres of wheat-stubble, and have 4 remaining. Some time in September plough 2 acres, and drill in tares, with a few winter-oats mixed to hold up the tares. The remaining 2 acres plough and drill in the same manner in November; if possible, early in the month.

Having for the present disposed of the wheat-stubble, we will pass over the usual winter's work—which does not concern our subject—and suppose spring-time come. There will then be 20 acres of barley-stubble not sown with clover, which will have to be ploughed and drilled with peas; our own experience being favourable to the early "haysal pea," with which we have had good success.

Next will come barley-sowing. On those fields which were occupied by peas 4 years previously sow a mixture of red clover and rye-grass, with a slight addition of white clover; and on other 6 acres sow white clover, trefoil, and rye-grass mixed.

We will now return to the wheat-stubbles. The rye must be finished feeding off by the end of April, so as to allow of beet being sown by the first week in May at latest. On the rye-stubble sow about 3 cwts. of guano and 6 cwts. of salt, or other manure of equal value (from 45*s.* to 50*s.* per acre); plough once, roll, harrow, and drill in beet, which we have always found thrive remarkably well after rye, the land being ploughed but once and treated as we have described. The roots will attain a larger size, and the land will be more free from weeds than if no previous crop had been grown. The trefolium can be either fed off or mown; but in either case the land should be cleared in time to allow of swedes being sown *before the month is out*, as they will not often thrive well if sown later. Sow on 3 cwts. of guano and 4 cwts. of salt, or some other manure of equal value; plough and roll twice, harrow, and drill in swedes. We have found the greatest success attend this plan during the last few years. We have mown the trefolium, obtaining considerably heavier crops than of clover and rye-grass on the ordinary shift; and have then had swedes to follow, which have quite equalled those grown on similar land around which has had no previous crop. The season of 1867 was specially trying for our system. For several weeks after the trefolium was cut the weather was excessively hot and dry, consequently there was not moisture enough in the land to bring up a plant of turnips; but when the rain at length came, the seed grew, and in the month of March we finished feeding off a capital piece of swedes. We now feel

assured that very little hazard attends this productive system in any season.*

The 4 acres of tares we mow for horses. As the land is cleared we plough once, roll, harrow, and drill common turnips.

We have thus sketched the needful operations connected with the herbage crop for the entire year, and may now pause to consider the succession of green crops we have provided.

JANUARY.—*Swedes;* we usually draw off one-third, feeding the rest on the land.

FEBRUARY.—The same.

MARCH.—*Beet;* we usually draw off half; less on the poorer fields and more on the better. Towards the middle of the month *rye* will be coming on. We either fold sheep on the beet and give them a few hours' run on the rye, or keep them on the rye and take beet to them there.

APRIL.—*Beet, rye;* towards the end of the month feed *trefolium* or *clover.*

MAY.—*Clover, trefolium,* with still a few *beet,* if possible.

JUNE. — *Clover, trefolium, tares,* with still a few *beet,* if possible.

JULY.—*Clover, second-crop clover.* It is probable that a sufficient bite will not have sprung up after the scythe on the clover-layers by the time the trefolium will be ploughed for swedes; it will therefore be necessary to feed some of the clover-layer, so arranging that there shall be a bite on it between the time when the trefolium is finished and the aftermath is getting ready. *Tares* will still be good food for horses.

AUGUST.—*Second-crop clover,* and *stubble-feed,* and *tares.*

SEPTEMBER.—*Second-crop clover, stubble-feed,* with night folds on *mustard* as soon as it is ready.

OCTOBER.—The same.

November.—Mustard and coleworts. Beet may be used now in the stalls if required.

December.—Mustard, coleworts, common turnips, after tares; swedes, if required. In the stalls swedes will now be available. If done gradually, stock will take no harm in being changed from beet to swedes, or *vice versâ.*

We have thus provided for the entire year, and we do not see how it is possible in any other way to produce an equal weight or value of food on such land as this.

There are two or three other plants not yet mentioned which are often cultivated. On certain soils lucerne and sainfoin are

* Since writing this essay we have had the experience of the present remarkable season of drought. Finding that the trefolium would be very short, we saved it for seed. This crop realised 10*l.* per acre, and the turnips we have after it are but little inferior to the average of our neighbours.—R. L. E.

very productive. Where there is no pasture on a farm, it may be well to keep a field laid down with one of these plants. They will both stand and be productive for several years without requiring renewal, and will often yield three or even four crops in the season; but they do not find much favour in the eastern counties, because they foul the land and derange the shifts. Lupins, too, are amazingly productive on poor sandy land, and though sheep do not like them, they will do very well upon them if fed off while in bloom. If a layer proves so thin in the first crop as not to be worth leaving for a second, the land may be ploughed and lupins drilled in. They will grow vigorously be it ever so dry; but we do not recommend the crop for regular cultivation unless upon land so poor as to be almost sterile.

The system we have thus described is perhaps better suited for grazing than for breeding stock. Where a flock of ewes is kept, in the place of a few of the swedes a few acres of late common turnips would probably be provided for them to lamb upon; but we believe that any deviation from the plan we have described would lessen the amount of production. Still it is quite possible that with some kinds of stock a less weight of a different kind and at a different time might be of more pecuniary value.

Land farmed on this system of double cropping will need to be kept carefully clean; but it will be found that clean land may be kept clean in this way with very little expense.

Where a farmer has to do with *heavier* soils he will have to arrange a different system. He will not be able so easily and so surely to double-crop. For instance, if rye is grown upon a tenacious soil, it will be very uncertain whether a proper tilth can be obtained when it is ploughed for beet to be planted in, and the hazard of missing a plant of beet will be greater than the value of the rye. So neither can trefolium and swedes be depended on to follow each other. Unless copious showers fall most opportunely, the trefolium stubble will be so hard that the plough will hardly break it up; or if ploughed, it will be so cloddy as to preclude any safe prospect of a plant of turnips. We have seen the two crops grown in one year on mixed soil land, and both of them good, but this has been in an unusually favourable season. We have found generally that trefolium is a very difficult plant to cultivate on good mixed soil. It does not "plant" kindly. And when a "plant" *is* obtained the slug will sometimes clear it completely off. We have sown it on such lands again and again, and have failed in obtaining enough to be worth leaving for a crop.

There are two methods of dealing with the root shifts on such soils, which have commended themselves to our notice. The

one is to devote almost the whole breadth to beet; the other, to introduce on the largest half of the land the system of double cropping, only in this case our second crop must be common turnips.

It appears to us that, at least in the southern half of England, the heaviest and most valuable production will be obtained by the former of these practices. Where a well-selected stock of the yellow globe beet (and stock is everything with beet) is cultivated with judgment, an enormous produce may be obtained. With use of proper means a full plant can always be secured; and with an application of 3 cwt. of guano and 3 cwt. of salt—that is at a cost for manure of about 45*s.* per acre—some 30 tons per acre of cleaned roots will be grown in an average of seasons. In connection with a farmers' club, we have often seen this crop weighed, and also swedes; in each case a quarter of an acre of *cleaned roots* being weighed. We found beet to vary from 14 to 44 tons per acre, and swedes from 10 to 25 tons. Here there is an enormous advantage on the side of the beet-crop, which has also the further advantage of being more certain, and, above all, the root will keep nearly all the year round.

A farm of 200 acres managed on this system will be thus apportioned:—

50 acres with wheat.

50 acres with roots; thus, beet, 45 acres; tares, 5 acres.

50 acres with barley.

50 acres with clover and peas; thus, red clover, 25 acres; peas, followed with mustard, 12 acres; white clover and rye-grass, mixed, 13 acres.

Our provision of herbage-food would then be as follows, viz.:—For January, beet; February, beet; March, beet; April, beet, clover, and rye-grass; May, beet, clover, and rye-grass; June, beet, clover, rye-grass, and tares; July, clover and rye-grass: second crop, clover and tares; August, clover and rye-grass: second crop, clover and tares; September, clover and mustard, and stubble feed; October, clover and mustard, and stubble feed; November, mustard and beet; December, beet.

In the case of good land we draw off from one-half to two-thirds of the beet-crop, leaving the rest upon the land where it grows to be fed off, as we find that either sheep or lambs may safely begin feeding on beet in the beginning of November. During this month and the next we feed them off just as they stand, as we rarely have frost to injure standing beet before Christmas. Those required for the next month or two, or for as long as it is prudent to feed on this kind of land (having regard to the barley that is to follow and its needful tilth and time of

sowing), we have pulled, and heaped where they grew—in November, and covered with a little straw and earth. These, of course, we have to cut and consume in troughs. For such time longer as we wish to keep sheep, we feed them in the yard until there is clover into which they can be turned to feed upon. Where grazing stock alone is kept, we believe this to be the best system possible.

But we will now detail the second plan we have spoken of, and which also has much to recommend it.

Example of 200 Acres of Good Mixed Soil.

50 acres wheat.

50 acres roots; thus, 10 acres rye, followed with beet; 10 acres rye-grass, sown on the wheat in spring, and followed with common turnips; 5 acres of tares to feed, to be followed with common turnips; 5 acres of tares to mow, to be followed with mustard (this will come earlier than the mustard after peas, which is a very important point); 20 acres beet.

50 acres barley.

50 acres clover and peas: thus, 25 acres of red clover; 13 acres white clover, and rye-grass and trefoil; 12 acres peas, followed with mustard.

Even on the stiffer mixed-soil lands it will usually be possible to obtain common turnips after rye-grass or tares, as common turnips will generally thrive if sown any time between the beginning of July and the end of August. In any ordinary season there will be rain enough in this long interval to prepare the land for the seed, however hard it may have been.

We shall thus have a continuous succession of green crops, as follows, viz.;—In January, common turnips and beet; February, beet; March, beet and rye; April, beet and rye and rye-grass; May, beet and rye-grass and clover, tares; June, rye-grass, clover, tares; July, clover, first and second crop, and tares; August, clover, tares; September, mustard and clover and stubble-feed; October, mustard; November, mustard, common turnips, beet; December, common turnips and beet.

In this plan there is less weight of roots provided, but there is greater variety of spring feed and more summer supply. Where a breeding flock is kept, this plan perhaps will be best, especially if there be no pasture on the farm.

In all the croppings we have sketched, we have estimated that we have supplied sufficient provision of clover to keep up the usual requirement of "stover" for the horses, besides providing a constant succession of green crops for green food all the year round.

Where neat stock is kept through the summer, it is sometimes

found convenient to grow a few acres of cattle-cabbages, to come in in August, September, and October, when the layers will be barest and the roots not ready. But from what we have seen we should not be much disposed to give cabbages a place in our system of cultivation, or, if at all, only upon a very limited scale. A few acres,—some two or three, will perhaps be well. In a dry season second-crop clover makes but a short "swath," and then a few cabbages will be very useful.

Rushmere, Ipswich.

VIII.—*On the Introduction and Cultivation of the newer Coniferæ and other Forest Trees, with special reference to the Climate of Great Britain and Ireland.* By Robert Hutchison.

THE thirst for novelty which may be regarded as one of the prevailing tendencies of the age in which we live, is no less conspicuous in the science of Arboriculture than in any other department of the many and varied occupations which engross the mental and physical energies of the present day. As a consequence of this desire to introduce "something new," and to add to the numerous varieties of Coniferæ which are already well known, and ornament our pineta and woodlands, the admirers of this interesting class of plants have been accumulating from all quarters, during the last thirty-five years, a hoard of seeds and specimens, both of coniferous and hard wood trees, which have been promiscuously planted by their introducers, unfortunately in too many cases without the slightest regard to their suitability to the soils and situations into which they have been imported. We need not wonder, therefore, if many of the efforts to introduce new varieties have proved futile, in so far as the capability of such plants to become valuable timber-yielding trees is concerned, or that the hopes of their planters should have been disappointed in finding that, after much expenditure of time and trouble, not to mention expense, they had obtained only shrubby and half-hardy evergreens where they had expected to rear useful timber-trees. Several of the earlier introduced of these recent importations having however succeeded well in certain soils and situations, as we shall afterwards specify, arborists have profited by the experience thus gained, and it is satisfactory to observe that, adapting their operations to the requirements and habits of the pines and trees which they wish to cultivate, planters are now becoming, year after year, more successful in rearing for ornament and use many of those rarer varieties which,

some years ago, when less understood, were almost entirely neglected and looked upon as unsuited to the climate and vicissitudes of temperature of the British Isles.

Taking the list of recently introduced coniferæ and forest trees, annexed to this report, as containing the principal varieties attempted to be acclimatized in Great Britain and Ireland, we may state that the efforts to introduce them have, upon the whole, proved more or less satisfactory and successful, and that in no instance have we discovered in our inquiries and investigations amongst the principal and best regulated pineta throughout Scotland, an instance of any one of the varieties named having been found unable to *exist* under the influence of our climate. The measure of success experienced in the trial of these new species in a country and climate hitherto unknown to them, as may be inferred from the foregoing remarks, has been very varied. But where attention has been paid to the rarer and more tender species, in the early years of their introduction, and until they had acquired some height, and become as it were established in the soil, there are many examples of their having not only thriven, but of their being now in such a condition as to justify the conclusion that they will hereafter prove valuable for shelter, ornament, and use.

In many parts of England there are numerous old and consequently large specimens; for they have been much more generally cultivated south of the Tweed than would be at first supposed. In some instances their utility for economic purposes as timber has been already tried and approved; and in Ireland, where also these rarer pines are better known than in Scotland, both climate and soil are well adapted for their healthy progress and vigour. Indeed in that country, as in England, there is a much greater number of old specimens than can be found, except in a few special instances, in Scotland. No doubt our Scottish friends have been deterred from trying these "new fangled" trees from a belief which is still too prevalent amongst us, that most of these coniferæ are unsuited to our climate so far north; an opinion quite at variance not only with all the experience we have been able to bring upon the matter, but simply absurd when it is remembered that many of the varieties have been introduced from habitats in a much more northerly latitude than that of the British Islands; and that a great bulk of those introduced are to be found in their native regions in latitudes almost similar to those of Great Britain, namely from 50° to 60° north latitude.

Such being the case, we shall in the present paper, in deference to this opinion, direct attention to the actual capability of these newer coniferæ, &c., generally, for withstanding the vicissitudes

of climate, and thriving in Great Britain, rather than give individual returns of their growth and progress, which we might do from the mass of information obtained and tabulated from many stations in all parts of the kingdom, in not a few of which instances we found that many of the species had already attained to what may be termed "timber yielding" dimensions, and are thriving vigorously.

There are four difficulties to be contended against in relation directly or indirectly to climate, in the introduction and cultivation of the newer coniferæ in this country, viz.:—

1st. The tendency in many of the species to push forth their young buds early in spring, and to continue growing on late in autumn.

2ndly. The variable character of the temperature of the climate inducing *uncertain* growths, and stimulating in an unequal degree in one season the strength and secretions of the plant.

3rdly. The fogs or hoar frosts to which we are so liable in spring and autumn, especially in the lower elevations, keeping the young wood and buds damp and unripened, and apt to suffer from the moisture becoming congealed into ice upon the branches and terminal shoots, which are thereby ruptured.

4thly. Wind exerts a very pernicious effect upon many of the newer conifers, especially in a climate and soil untried by them hitherto.

In reference to the first of these difficulties which planters in this country have to contend against, we may remark that the growth which many of the varieties referred to—such, for example, as *Wellingtonea gigantea*, *Abies douglassi*, *Pinus insignis*, and in some situations *Picea nobilis*—make in one season, is really marvellous. We have repeatedly seen from three to four feet of terminal shoot formed in a single year, and this rapid growth, at one time nipped by the frosty winds and nights of spring, and again suddenly checked by the cold of autumn, when in an unripened state, runs considerable risk of total destruction. Happily, however, this habit is lost to a great extent as the plants acquire stature and robust form, and if a little care be taken to shelter them amongst other trees as nurses, until their heads are reared *above the dew-line, or hoar frost level*, most of the species will withstand with comparative immunity the other extremes of our climate. The pines most addicted to early growth in spring, and to late growth in autumn, are the *Abies morinda*, *Pinus cephalonica*, *Pinus pinsapo*, *Pinus macrocarpa*, and *Pinus lambertiana*.

With regard to the second difficulty mentioned, namely, the variable character of the temperature of Scotland inducing uncertain growths, and exciting in an unequal degree in the same

season the strength and secretions of the plant; in the very severe winter of 1860-61, we found many of the pines named in the list appended to this paper standing the most intense degrees of frost, while the very same specimens have since been injured by the changeable weather of the spring months, becoming browned in foliage by the continuance of a frosty wind after genial open weather, the growth being doubtless impeded thereby. It is to this cause, we think, that the doubts as to the suitability in relation to climate of most of the newly introduced coniferæ is to be ascribed, rather than to any uncertainty as to their ability to withstand with impunity the degree of frost to which they are subjected in Scotland. For example, we found in the memorable winter of 1860-61 the *Cupressus lawsoniana* at Oxenford Castle, braving uninjured the severity of that season, with the thermometer at its very roots indicating *twelve degrees below zero*, while the same conifer has in several instances been found by us since then, browned by the frosty winds and nights of March and April.

3rdly. We stated that the recurrent fogs and hoar frosts of spring were prejudicial to these new pines. In support of this statement we may mention that, in 1860-61, having had occasion very particularly to examine the state of trees and shrubs, we found that a greater number perished from the effects of the hoar frost and "*häar*" than from the severity of the frost itself.

4thly. Wind is another great enemy to the progress and establishment in this climate of these rarer trees, especially to these of the coniferous order. Their evergreen foliage and heavy mass of branches exposed to the rockings of the blast prove most prejudicial to their progress and welfare. Their roots become strained and loosened from the earth, and the spongeoles of the rootlets are ruptured by the oscillating motion of the plant overhead during the frequent gales to which they are subjected, rendering true the saying of a thoroughly practical forester, to whom we lately spoke regarding these newer introductions, which he had in large numbers under his charge, when he said, in reply to our question how his new pines were thriving with him? "Oh! well enough, if the wind wud gae them peace!"

Another fruitful source of failure to many of the rarer pines and trees is the practice of planting them when young in too rich soil. With mistaken kindness, they are often placed in leaf mould, or in "rich" soil made up of decomposed vegetable matter. This only engenders filth about their rootlets and fibres, besides encouraging insect larvæ, which afterwards prove destructive to the young wood of the plant. Many of the species

thrive best on a poor soil; for example, the *Araucaria imbricata*, which on a rich loam does not progress nearly so well as it does upon a cold thin soil in an exposed open situation. Among the hills and upper moorlands of Sutherlandshire, this Chilian pine may be seen thriving vigorously; while in sheltered spots in a loamy soil it has often sustained much damage from the variations of the temperature of our climate.

It is quite possible, however, to provide in a great measure against these evils to which our *protégées* are exposed, and it should be the earnest endeavour of every lover of such beautiful varieties to do his utmost to secure them from those dangers, which are almost the only ones to which, in this climate, they are liable.

To remedy the first difficulty, let them be planted in back-lying situations, where neither early spring nor late autumn growths will be encouraged; and to ripen the young wood as well as possible they should be placed in *open* situations, and not in too thick coverts. This will also, in some degree, obviate the second mentioned drawback to their healthy development. As to the remedy for the third objection their natures may have to our climate, it is obvious enough. The difficulty is purely local, and only holds good in very low valleys, and inland elevations where the sun shining brightly during the day thaws the ice upon their branches in early spring or even in winter, and where from lack of altitude the frosts of night are more intense than on the higher neighbourhood; generally speaking the higher altitudes suit, for this reason, these conifers best, and where lofty positions have been found tolerably sheltered from wind, we have found the finest specimens. Wind is the only enemy to the pine family, and indeed to trees generally, against which we have no certain remedy. To a great extent, however, with these rarer and finer varieties its ravages may be mitigated, if a little care be taken in selecting positions for them free from the gusts and blasts of the prevailing winds of the district. Further, in regard to the minor evil we named, namely, that of planting in too rich soil, we may remark that as each variety has its own chosen description of soil in which it thrives best (being its natural one) the custom of making up for this defect, by substituting artificially "made up" soil to promote the growth of the plant, is worse than useless, for after probably a year's growth, it will be found that the rootlets have pierced beyond this artificial basin, and have penetrated into the natural soil of the locality, whether suited to them or not; and certainly in the same ratio in which they may have been artificially stimulated, and pushed forward by the made up fresh soil, will they, on finding their stimulant at an end or exhausted, be retarded by

the sudden change or withdrawal of this auxiliary sustenance. A much better mode of aiding their establishment in their new abodes is to pulverise well with the spade the earth of the pits into which they are planted. The bottom earth of these pits should be well loosened and broken, to encourage a free and steady progress in the roots' development, and to enable them to strike deeper and to take that hold of the ground which is their best safeguard against the fury of the gales to which they may be exposed.

Independently, however, of these general causes which operate against the successful introduction and cultivation of the newer pines and trees, there are other reasons which frequently in particular instances account for many cases of failure. But as they are rather to be found in the individual treatment of the species or plant itself, than in any deficiency in hardihood natural to it, we do not feel warranted in the present paper, in mentioning such causes in detail. We shall only briefly glance at them; they are practices which we have no doubt time will remedy, as they consist principally in the modes of propagation.

For example, many of the finer conifers grow readily from grafts, layers, or cuttings. *Picea nobilis*, *Pinus ponderosa*, *Cedrus deodara*, *Cupressus lawsoniana*, *Wellingtonea gigantea*, and many others, are reared and increased by these means. Plants formed in this way, however, are never so fine as specimens, nor so robust in habit, as those grown from seed. Another way in which sickly and unsatisfactory plants are also procured, and which in like manner leads to disappointing results in after years, and aids in bringing discredit upon their genera, is by raising many of the varieties from home-grown cones. We have heard gardeners and foresters boast that these new pines were in some instances "*fruiting freely*" with them; and we know examples of the *Abies douglassi*, and others, annually producing cones in this country. At Fingask (Perthshire), for example, the *Cupressus lawsoniana*, growing in garden loam, and about 7 feet high at that time, bore cones in 1862. At Durris (Kincardineshire), the *Abies douglassi* was planted from seed in 1840, and is now above 50 feet high, and produces annually "loads of cones." These, however, have germinated few plants. Again, in the same pinetum, *Picea nobilis* also planted in 1840, now about 36 feet high, has borne five crops of cones, from which in all about 8000 plants have been raised.* At Madres-

* Since this sheet was sent to the press, we have learned that this splendid specimen was blown down in the gale of January, 1868. It had, however, been happily photographed the previous season, and the plate presented to the Scottish Arboricultural Society in Edinburgh.

field Court, in Worcestershire, *Cupressus goveniana*, about 17 feet high, was, in 1863, covered with clusters of its quaint-looking cones; but from two large seed-pans sown with their produce, only one plant was raised. Now, although, these seeds may sprout and grow well enough in the border or pot to which they are committed, they are the progeny of a tree bearing fruit in an abnormal condition; for in their native habitats, these pines take many years to arrive at such maturity as to produce healthy and abundant crops of cones; and they cannot be expected, under equally healthy circumstances in this country, to produce cones at an earlier age, nor is it prudent to sow the seeds of such precocious parents. The cost of importing fresh seeds the produce of hardy full-grown trees, will be more than compensated by the vigour of the young plants, and their after condition will probably be such as to free the species from the stigma of being thought unsuited to the climate of Britain.

One word as to the soils which seem best adapted, and have since their introduction been found most suitable, for the healthy development of these beautiful plants. Most of those in our list have thriven best upon an ordinary average loam, of sufficient depth to form a bed for their branching rootlets, with a dry subsoil. The *Abies* do not require so deep a soil as the *Larix*, *Pinus*, *Cupressus*, *Taxodium*, or *Picea*. In too rich soil, they are apt to acquire the habit we have mentioned as so pernicious to their welfare, of making annually too rapid growths of young wood. In a poor soil, if well-drained, their habits are sturdier, and although their progress may not be so rapid, it is nevertheless more satisfactory; and when the value of the timber comes to be tested, it will be found that the more slowly the tree has been allowed to develop its timber, and the less it has been induced by overcrowding in too rich soils to attain too early maturity, the harder and more valuable will be the quality of its wood. This must hold good of every variety.

Several species, such as *Abies morinda*, *Abies menziesii*, *Cupressus lawsoniana, and Wellingtonea gigantea* prefer a rather damp soil, upon a wettish subsoil; and all of these varieties, we have observed, have thriven best in such situations. Upon the chalky and limestone formations, if near the surface, none of them will thrive; and where coal crops out near their roots, they linger out a miserable stunted existence. The *Abies maritima*, and *Pinus lambertiana* have been noticed to grow most vigorously in a sandy free soil, while such a position does not suit most of the varieties we have named.

List of recently introduced Coniferæ and Forest Trees, which may be regarded as generally suitable to the climate of Great Britain and Ireland, ascertained from Returns from various soils, altitudes, and exposures furnished us by practical and trust-worthy growers of the species named.

Name of Species.	Remarks.
Wellingtonea gigantea	Universally vigorous.
Thujopsis borealis	Very hardy.
,, dolabrata	Not in general cultivation.
Thuja gigantea	Very universally hardy.
,, lobbii	Not so generally grown.
Cupressus lawsoniana	The hardiest of the Cupressus family.
,, lambertiana	Sometimes tarnished by winds.
,, goveniana	Generally stands well.
Cedrus deodara	Requires care when young.
,, robusta	Better habit and leader than above-named variety.
,, libani	More adapted for England than for Scotland. Thrives well in Ireland.
,, atlantica	Hardy.
Abies douglassi	Worthy of extended cultivation.
,, orientalis	Ditto.
,, menziesii	Sometimes rather deficient in Scotland.
,, obovata	Not generally grown.
,, mertensiana	Hardy.
Picea nobilis	Hardy in most situations.
,, cephalonica	Sometimes suffers from spring frost.
,, pinsapo	Sometimes browned in spring.
,, bracteata	Sometimes suffers from spring frost.
,, nordmanniana	Hardy in most places.
,, balsamea	Ditto.
,, canadensis	Ditto.
,, fraseri	Ditto.
,, grandis	Ditto.
,, pichta	Ditto.
,, pindrow	Ditto.
,, religiosa	Sometimes injured by spring frosts.
,, rubra	Hardy.
,, webbiana	Ditto.
Pinus laricio	Worthy of general cultivation, and where rabbits abound.
,, excelsa	Sometimes doubtful.
,, lambertiana	Peculiar as to soil and district.
,, monticola	Hardy.
,, ponderosa	Ditto.
,, insignis	Sometimes suffers from frost.
,, maritima or pinaster	Valuable for coast planting.
,, taurica	Hardy.
,, cembra	Very hardy.
,, uncinata or mugho	Hardy.
,, rigida	Ditto.
,, pyrenaica	Very hardy.
,, austriaca	Ditto.
,, sabiniana	Usually hardy.
,, taeda	Ditto.
,, taxodium sempervirens	Browned by spring winds in some situations, but thriving in many places.

Carlowrie, Kirkliston, N.B., December, 1868.

IX.—*Variation in the Price and Supply of Wheat.* By H. Evershed.

The industrial condition of the country, suffering from the panic of 1866, was unfavourable to a transition from cheap to dear bread, which occurred contemporaneously with a reduction in the price of most other articles of produce. The prices of wheat per quarter, according to the imperial averages, were—1865, 41*s.* 10*d.*; 1866, 49*s.* 11*d.*;* and in 1867, 64*s.* 5*d.* A rise of 25 per cent., after the average crop of 1866, shows that the stocks of old wheat were small, and that a considerable rise in price had not been expected. It has often been asserted that the price of wheat would always rule low in time of peace, owing to the wide area from which we draw our supplies. It has even been stated that a complete system of agricultural statistics in all the corn-producing countries would prevent any other variation in price than that due to the difference of freight. But there is a law of variation that applies even to wheat. Its production is subject to a variety of disturbing causes, which act on markets and affect the price. We propose to inquire into the causes of variation.

The great sources from which our supplies are drawn are America, the Black Sea, and the Baltic. France only produces a surplus in years of abundance; she has been a corn-importing country for half a century, and occasionally outbids our merchants on their own markets. Variation in price is, no doubt, mainly, though not entirely, due to the great difference in the yield of the crop; as for example, in the case of our own deficient harvests of 1860, 1861, and 1867, compared with the large wheat-crops of 1863, 1864, and 1868. The year 1865, which promised so badly during the cold, ungenial spring, gave on the whole a full average return; for, although the light thin soils had suffered past recovery, a favourable blossoming time and a genial summer scattered over our fields in general an unexpected fruitfulness.

Although the difference of seasons is beyond our reach, we can, to some extent, control the conditions of agricultural production and moderate the evils of scarcity. Extremes are partially avoided under an improved system of farming. It can easily be shown that the variation of yield is least in such countries as England, the north of France, and the best-peopled parts of the Continent, where an alternate system of husbandry

* The price of the year does not indicate the actual changes in the market barometer; in 1866 a rise of 10*s.* or 12*s.* a quarter took place in the last six months.

is pursued, and grain-crops are separated by green-crops in the rotation; and on the contrary, it is greatest in new or thinly-populated countries, where the system of cropping is bare fallow, followed by as many grain-crops in succession as can be extracted, until the cleansing and restoring fallow is again indispensable.

In such cases, farming is carried on, without resources, on a hand to-mouth system. When there is no demand for stock, the "ameliorating crops" cannot be grown, and the repetition of grain-crops, without return to the soil, destroys its productive power. In a new settlement, production is expansive so long as fresh tracts continue to be reclaimed, but the land is wasted by constant cropping; the settler lives on the spoils of the soil; he marches onward, subduing the wilderness and exacting tribute, but his course is marked by the devastation of the land. And this is a source of wealth which, however great, is continually decreasing. It is well known how much the yield depends on season. Mr. Morton's paper in this Journal, on Agricultural Maxima*, affords interesting proofs of the immense influence of the season; and Mr. Lawes's experiments show that even on land purposely exhausted, the yield, in very favourable years, takes a jump and becomes considerable: the extraordinary vigour imparted to the plant apparently overcomes the adverse conditions of cultivation. In such seasons, even over-cropped and slightly-cultivated land becomes productive, as it did in 1863 and 1864, when the great harvests in England, France, and the Continent generally, caused what must be considered a state of "over-production" and extreme cheapness.

These extremes will always be excessive while the system of farming in other countries is scourging, and that of our own falls short of the high standard which is still exceptional among us. In the south of France the extremes of yield, and the evils arising therefrom, are far greater than in England.

The most reliable information as to the agricultural condition of the great corn-producing countries is found in the reports of British Consuls. We have taken considerable pains to examine these, scattered as they are throughout the pages of a great number of Parliamentary Blue-Books. They show the effect of "crop and fallow" farming in speedily taming the exuberance of the most fertile soil, and prove that the supposed fertility of new countries is practically a romance, however great their capability may be; the actual average yield of corn being little more than half that of our own worn-out fields! Wherever the population is scanty and agricultural, the yield of corn must

* Vol. xx. p. 442. First Series.

be small; as it is in the old corn-exporting countries, where the triennial system of cropping prevails. A classic writer, in pointing out the defects of this ancient rotation, described our own experience, as well as that of Roman agriculturists, when he said, "Your land would be equally well restored by changing the crops, and then there would be no rent to pay for land that yields nothing." Yet the triennial system [1. Fallow; 2. Wheat; 3. Spring corn, or wheat] was long considered the best and only good one; in proof of which were cited its antiquity and universality, its cheapness, ease, and simplicity, the little capital it required, and its close connexion with established laws and customs, which would have been annihilated by any change of practice. In the reign of Charlemagne, the triennial rotation was dictated to the officers and stewards of the immense estates farmed for the king. Thaer, who witnessed the dawn of a new era in agriculture, writes in the 'Principles of Agriculture:'—

> "It became prevalent throughout Christendom (in the time of Charlemagne). No change was made in the dark and troublous times which followed, when agriculture was essentially carried on by a class of peasantry, men buried in the depths of slavery and ignorance, or under the inspection of the lowest grade of freemen. Those institutions and practices which custom had sanctioned, swayed the arts and sciences for a considerable lapse of time with irresistible power; and any one who ventured to express the slightest doubt of their conformity with the laws of reason, was regarded as little short of a heretic. It is only of late years that anything like discussion on the virtues and defects of this system has arisen; and it was only on some portion of the land in the Netherlands, Holstein, and in some counties in England where any other system of cultivation has been adopted."

Thaer was called in Germany "the father of the alternate system of cropping," by which clover and roots are introduced into the rotation, and the land is "restored by changing the crops" and by manure. But he failed to introduce his improvements where circumstances were not yet ripe for their adoption. A large population and good markets for all her products are the *sine quâ non* of improved agriculture, and the improved system which was adopted in certain populous countries and districts is still confined to them. A stock farmer, as a grower of roots and green crops and an importer of feeding stuffs, is able to increase the productive power of the land, and in so doing to diminish the cost of production; and he occupies a strong position as a corn-grower, from which the competition of mere "grain-and fallow" farmers cannot drive him.

Thaer, who was a close observer and a zealous farmer, says, in describing Continental farming, that the fallow, in the triennial and biennial courses, ought always to be manured; but this can only be done where there is a great deal of meadow-land, or

where stall-feeding and the cultivation of plants for fodder gives a supply of manure :—

"In general only every second, and sometimes every third, fallow is manured, and thus the fields are only ameliorated once in every six or nine years. The small produce, under such circumstances, is well known to every person."

He considers fallows to be necessary, notwithstanding their expense; and that it is impossible to dispense with them in rotations where roots or forage-plants have no place, except with the assistance of some extraordinary means of tillage. Where the attempt has been made, even on land near towns and well manured, the ground has been filled with weeds and the crop has become very scanty. The "industrious Belgians" tried to dispense with fallows by sowing grain alternately in narrow strips, and bestowing the most careful tillage on the intervals, which were sown the following year. A similar attempt has been made in England in recent years; but the cultivation of alternate strips of grain and fallow is worthless as a system of farming, though interesting as an experiment.

The Corn-growing Countries of Europe.

The countries bordering on the Baltic and Northern Ocean form a great plain, seldom much above the level of the sea, narrowing as it approaches its western limits on the French frontier, and gradually widening towards the east until it meets the great plain which stretches over the whole of Russia from the Baltic to the Black Sea. Between the Rhine and the Elbe, the average width of what is, in fact, a continuation of the great eastern plain of Europe is about 160 miles. Eastward of the Elbe the average width is 300 miles. It includes the whole of Hanover, and great part of Westphalia and Saxony. With the exception of the alluvial deposits and reclaimed marshes of Holland, the deltas of the rivers, and the wide river-bottoms, this extensive district is generally poor and unproductive, only a comparatively small portion of it contributing to the exports of grain from the coast. The mountain-ranges of Germany and the Carpathians form the southern boundaries of this region, and separate it from the fertile countries drained by the Danube and its tributaries. The rivers are at once the source of fertility and the means of conveyance, and at their mouths are the corn-ports, which we may consult as the great pulse of an agricultural country. The Vistula and the Elbe are the chief grain-carriers of North Europe, whilst Dantzig and Hamburg are the chief corn emporiums. Rostock and Stettin are smaller grain-ports

on the Baltic, connected with the same wide district by railway or water communication. Kœnigsberg, insignificant twenty years ago, has now become a large grain-port; it is the outlet for East Prussia and the adjoining Russian Provinces. Under the stimulus of an extraordinary demand for corn in manufacturing countries, arising from the rapid increase in wealth and population during the past twenty years, the agricultural capabilities of these countries have been severely tested, and the exportations of corn from them have greatly exceeded the calculations of Mr. Jacob, and the more recent estimates of Mr. Meek, who visited the corn countries of the Baltic in 1841. All subsequent estimates of prices and supplies have been based on the elaborate Reports of these two gentlemen, who, as agents of our Government, had every facility for acquiring information. They both greatly underrated the agricultural capabilities of the countries they visited.

During the fifteen years following the abolition of the Sliding Scale in England, the exportation from Dantzig to this country, of wheat alone, averaged 465,000 quarters a year; and the usual exports to Holland and Belgium are 80,000 quarters. The exports of rye to Sweden, Norway, and elsewhere, were about 250,000 quarters in 1865, which does not greatly exceed the average. From Kœnigsberg, the next largest grain-port of Northern Europe, the average exports of all sorts of grain for the six years ending 1865 were nearly 900,000 quarters a year. This enormous increase in the production of corn shows the produce of agricultural industry. Will it continue? and will it keep pace with the vast strides in commercial industry? All the rich and thickly-populated countries import corn. Germany exports at present, as England did, until towards the end of the last century; and the tide may turn from the same cause. We have elsewhere shown the rapid development of manufacturing and mining in Germany.

Mr. McCulloch's estimate of the future price of corn was singularly correct. The data on which he formed his opinion of future prices were, and still are, comparatively trustworthy, and they will probably remain so while new land is available and production can easily keep pace with consumption.

Some of our Consuls, who have the best means of judging, have stated that the improving agriculture of the old exporting countries will not lead to larger exports of wheat; because, the population being at present fed on rye and inferior grain, will absorb the extra growth of wheat. It is impossible to calculate the future balance of consumption and supply in these countries, where increased production follows, but cannot precede, an in-

crease in wealth and population. In the purely agricultural countries of Europe, we find that the proportion of rye and other inferior grain-crops in cultivation is from three to five times as much as that of wheat. Wheat is grown for exportation until the land is reduced to the rye-stage, and from this low mark in the scale of corn-growing it cannot be raised until the consumption of animal food introduces ameliorating crops into the rotation. And this requires a home-population, which returns to the soil what it has received from it and maintains its fertility. More wheat and more animal food are consumed, and much grain is used as food for cattle in the winter months.

Quoting the case of an essentially agricultural country, where other industries are quite subordinate, and the only manufacture is that of abstracting sugar from beet, we find that in Poland there are five times as much rye and four times as much oats as wheat; whilst there is a smaller breadth of green-crops than of wheat, and five times as much bare fallow. The official returns of the growth of grain in 1860 were 11,400,000 quarters; the inhabitants living chiefly on rye-bread. Wheat is grown only on the best of the fallow which can be manured, and its average production is only 1,470,000 quarters,—slender rations, as far as wheat goes, for a population of 4,840,466. The export depends on the temptation to sell. A sudden rise on our markets has a singular effect in wringing wheat out of poor countries. A Report of the Agricultural Society of Poland points out, with great truth, that a succession of crops is not of itself sufficient to restore fertility; the mere subdivision of the cultivated soil, when it is exhausted, is insufficient. The want of capital precludes the use of artificial manures, or the adoption of draining and similar improvements. The length and severity of the winter, and the coldness and frequent dryness of the spring, are also great drawbacks. In 1861, the price of wheat was 42*s.* per quarter; whereas the average for the previous thirty years had been 18*s.* per quarter. Prices generally, both of grain and of stock, have doubled of late years.

The Government statistics state the yield of grain at a little over 1 quarter per acre; the Consul, however, prefers the figure 14 as representing the average yield of wheat in bushels. It is singular that this unknown quantity—the yield of wheat per acre—should be expressed by the same symbols in so many countries. In America, the south of France, the Russian provinces, in the countries of the Black Sea and the Baltic, the same figures are used. In England, the figures 26 or 28 represent our unknown quantity, and perhaps express our belief that we farm twice as well as anybody else!

Colonel Stanton's Report on Poland * gives a graphic picture of the retrograde and barbarous condition of agriculture in that unhappy land; but whether we look on this picture, or on that of some new and prosperous colony, we see that improved agriculture requires an outlay of capital which can only be incurred in a wealthy and populous country.

French Agriculture.

We shall commence a brief sketch of the corn countries by a short account of the agricultural condition of France, the nearest and greatest of our neighbours. The French press constantly refers to the rise in the price of wages and the scarcity of agricultural labourers, arising from "emigration from the fields," and the continual drafting of the youngest and best workmen into the towns, where they find better-paid employment. An increased labour-bill is a heavy burden to the French farmer, and nearly the whole of its weight falls on wheat, which is his staple production. "The growth of wheat," says a French agricultural writer, "is the sole aim and object of almost all French farmers." The breadth sown is three times as much as that of roots and green crops; while in the United Kingdom it is only in the proportion of two to three. The burdens of rent and taxation have also increased; and in the case of the numerous small proprietors, it is to be feared that the equivalent for rent —the interest on capital sunk in the purchase of land—has increased in still greater proportion. The competition for small plots of land in rural districts, owing to the intense desire for ownership among the peasantry, has artificially raised its price. They are ignorant of any art but that of farming, and of any mode of investing their savings except by the purchase of land, after the fashion of their forefathers. The transfer of these minute properties is costly, and the peasant-proprietor is often overburdened and short of capital before he reaps his first acre of wheat. If the price be low, he becomes extremely pinched, as was the case in recent years. His attachment to routine, his want of intelligence and observation, and, above all, of capital, are much to be lamented. But the ruin of a small farmer is a slow process in any country, especially in France. Losing his capital is only a short step towards it; his credit remains; he takes to rye-bread, and sells all his wheat instead of only a portion of it. He and his must work harder and live harder; the beloved plot of land suffers latest of all; but by-and-bye, where little was spent nothing can be afforded, and the end seems

* See Appendix.

approaching. Then comes a new crop, and a turn in prices. Ruin seldom quite overtakes a small farmer.

The Métayer system and the "*petite culture*" are bad institutions for corn-growing. Small farming succeeds where the variety of the crops and the care of the dairy, the garden, and the orchard afford constant occupation to the farmer and his family, as in Jersey, some parts of Switzerland, and Italy; but corn-growing for exportation should be a wholesale business, conducted on a large scale, and with the necessary machinery. The 'Journal d'Agriculture Pratique' constantly points out that "wheat is grown at a costly rate in France by the Métayer and small proprietor-farmers, because they have neither the system of cultivation, nor the proper implements for obtaining the greatest return at the least cost." It is only in years of abundance that there is a surplus for exportation.

While wages have risen and rents have increased as ten to one since 1750 (they were then 3*s.* 6*d.* an acre under large, and 9*d.* to 1*s.* an acre under small, farming), the price of wheat remains the same as in the latter part of the century. Quesnay estimated the average yield of corn in France, in 1750, at 17 bushels an acre under large farming, and 8½ bushels an acre under small farming (after deducting seed). The present estimated average return for wheat only is 14 bushels an acre (after deducting seed): a quantity not greatly exceeding one half of the estimated average yield of wheat in England. The breadth of land in wheat had increased under the sliding-scale, but has retrograded under free trade; the slight apparent increase being due to the annexation of territory. During the recent years of low prices, it is said that the growth of wheat on soils yielding less than 13 bushels an acre was abandoned. Land naturally poor, or exhausted by scourging, may yield a slight profit in rye, but none in wheat.

In the last year of the Continental War (1815), the statistical return of the yield of wheat showed the low average of 9 bushels per acre, partly owing to the bad season, and partly to the decimation of labourers during the war. The breadth sown was 11,500,000 acres. In 1838 the breadth was 16,500,000 acres, and in 1866 it was 17,250,000 acres. For the forty-three years succeeding the war the average yield of wheat for each decennial period varied from 12½ to 15 bushels an acre; for the five years ending 1865, and including the great harvests, the average crop varied from $12\frac{3}{10}$ to 18½ bushels an acre. These last figures are due to the crop of 1863, when the yield of wheat was the largest ever known in France, that of 1838 (a year of extraordinary abundance) having been slightly inferior. These figures show the extreme variability of the crop, but

afford no evidence that the average yield is increasing at the present time.

The true test of agricultural progress is the increase of production arising from improved cultivation. In this respect the progress in a hundred years under *petite culture* has been slow, and the cost of growing wheat has been reduced very little, —and not at all, if the Journal already quoted be correct in maintaining that when the price of wheat falls below 49*s.* a quarter the French farmer ceases to prosper. Where little besides wheat is grown, the dependence on a single article of production causes an adverse price to be severely felt, and fluctuations in price are at once more frequent and harder to bear. The minimum cost of production in France is not likely to be at present reduced.

In average years there is already an excess of imports over exports; and although the northern districts, favoured by climate and a large population, will, no doubt, become more productive, it seems probable that France will long continue to be a corn-importing country. The excess of imports over exports of wheat averaged 180,000 quarters a year from 1820 to 1860; from 1861 to 1865 inclusive, the excess of imports over exports was 912,000 quarters a year; in 1861, when the harvest was deficient, the excess of the imports of wheat over the exports was 4,700,000 quarters; in the following year it was 1,700,000 quarters; and it has only been during the recent wheat-flood that France has figured largely in the opposite direction—to the extent, in one year, of 2,000,000 quarters. The increased importation of wheat has been partly owing to the alteration of the corn-laws on June 15th, 1861, when the sliding-scale was abandoned in favour of a fixed nominal duty on corn imported. Wheat for grinding and re-exportation, as flour, is admitted free. Quoting from a circular by M. Béhec, late Minister of Agriculture:—

"The process is to import wheat at the southern ports free of duty, and available for consumption in that part of France, and to export from the northern and western sea-board an equivalent in flour made from French wheat. This system has the double advantage of bringing wheat into the southern departments, where the growth of cereals is insufficient for consumption, and of opening a market for the northern and western departments, which generally produce more than they require."

In 1750 the population was sixteen to eighteen millions; it is now thirty-seven millions. With a greatly-increased breadth of corn since 1750, the production of wheat has tripled; that of oats has quadrupled; while that of barley and rye remains the same. Twenty-four million quarters of wheat, barley, and rye (after deducting seed), and 4,000,000 quarters of oats, were

grown in 1750, according to Quesnay, on 21,000,000 acres of land, ($10\frac{2}{3}$ bushels per acre). The present breadth of cereals is about 39,000,000 acres. Cattle have doubled in the same period; the number of non-agricultural horses has largely increased. The improved condition of the labouring classes and of the people generally has greatly affected the consumption of wheat. They have entered that stage in social economy when wheaten flour begins to be substituted for that of rye and other inferior grain. The miserable condition of the peasantry in France, in the middle of the last century, was without a parallel in the history of Europe. It is related that in one year of unusual scarcity the Duke of Orleans laid on the council-table a piece of black bread, made partly of fern-leaves, as a specimen of the diet of the country people.

The price at which corn can be grown cannot be learned from statistics. It is more to the purpose to inquire the actual condition of agriculture under fluctuations of price. The average prices in 1863, 1864, and 1865, were 46*s.*, 41*s.*, and 38*s.* 6*d.* per quarter. There is no doubt that the low prices of this period caused much agricultural distress. The press constantly discussed "the sufferings of agriculture," and the Central Agricultural Society held a succession of meetings to consider the general subject of agricultural distress and the expediency of a duty of 2*s.* 6*d.* a quarter, and a reduction of farmer's taxes to the amount of the revenue thus raised.

The fact of agricultural distress was recognised in circulars issued by the Minister of Agriculture; it was referred to in the Emperor's speech on opening the Chambers; it formed the subject of an important debate, and a Commission of "inquiry into the condition of agriculture" was then appointed. An "Inquiry," furnished with elaborate means of obtaining evidence and assisted by the numerous Agricultural Societies of France, could not fail to obtain a vast amount of information on agricultural affairs. There is no doubt that wheat cannot be profitably grown in France at 40*s.* a quarter; and however much our own agriculture may be depressed by a period of low prices, it cannot be endangered by the competition of our nearest neighbour.

The broad distinction between English and French agriculture is the relative proportion of the various crops and of bare fallow, and especially the breadth of cereals grown for human consumption. In France this breadth is one-fourth of the cultivated land; in the United Kingdom one-seventh. France, with rather more than double the area of cultivated land, has five times as much land in wheat as the United Kingdom; thirteen times as much bare fallow; of roots and green crops, France has 6,200,000 acres against 4,900,000 acres; of clover and

artificial grasses, 7,000,000 of acres against 5,700,000 acres; and of pasture and meadow land, 16,360,000 acres against 22,200,000 acres. France has 5,400,000 acres under vineyards. The various schemes for raising capital, by means of credit, to supply the "great want" of agriculture will probably prove abortive, until a population, larger and better fed, admits of a more expansive system of farming.

Provinces of Southern Russia.

These provinces are peopled generally, though scantily, by an agricultural and industrious race. Labour is lower than in America and land equally cheap, and, in favourable seasons, equally productive. These are the oldest corn countries in Europe. Herodotus describes South Russia as "a plain country of a deep soil;" the inhabitants were "husbandmen, who sow wheat not for food, but sale." The first kings were the sons of Jupiter and a daughter of the river Borysthenes (the Dnieper). It was in their reign that the sacred gift of the golden implements of husbandry fell down from heaven. The historian qualifies a rather fabulous narrative with the remark, "if any man think these things credible, he is at liberty; for me, I am obliged to write what I have heard." But though the plough was not so directly the gift of heaven as the ancient inhabitants believed, the art of husbandry was practised by them a thousand years before the invasion of the country by Darius, and their corn was carried to the markets of three continents, as it is still, feeding the diverse races that dwell on the shores of the Mediterranean and finding its way to our own coasts.

In glancing through the Reports, a great and almost fatal drawback to agricultural development forces itself on the attention. The climate is one of extremes, and the harvests are consequently exceedingly various. We read, "the main difficulty which agriculture will have to contend with will be the droughts to which this country is subject." The disturbed state of agriculture during the "transition from serfdom to free labour," the "scanty population," the occasional destruction of the crops by locusts and rats, the insufficiency of the means of communication; the want of roads and the difficult navigation of the rivers; the difficulty of access to the ports, the dangerous navigation and the expense of lightering owing to the bars of sand, the filling up of the harbours by the drift brought down by the rivers,—all these are hindrances which may be overcome by time, capital, and labour; but the disadvantages of the climate will be felt more severely in proportion as agriculture progresses and wages and other expenses

increase. Under serfdom, the immense territories of the proprietors were farmed at the least possible cost; the main object was to raise food for the inhabitants. In favourable years a store was accumulated; buried, perhaps, in heaps, and covered up with earth, to be dug out when the years of plenty came to an end. Occasionally, the wants of other countries made themselves known, even in the most distant provinces. The cultivators were tempted to break into their heaps. The mass of sprouted corn which thatched and protected them was stripped off, and the grain sold to the merchants, who, like the sons of Jacob, had "come down to buy corn," because of the "dearth in all lands." The corn was then loaded on pack-horses or into carts, and sent off in little driblets to the coast. The Greeks, who monopolised this traffic, generally secured a profit of 10*s.* to 15*s.* a quarter. It was a golden age for corn-merchants!

As to the husbandman, he sold at these times what had cost him little and might otherwise have been wasted. The "cost of production," as we understand the term, has no place in these primitive transactions. Now, however, the word labour is beginning to have a real meaning among the Russian land-owners; and when capital, labour, and rent assume their place in the rural economy of Russia, the effect of an occasional failure of crops will be more fully realised, and the price for which corn can be grown for delivery at Marseilles and in London will then be ascertained. On the whole, it is unlikely that the farmers of South Russia will ultimately be able to compete with those of France or America, much less with those of the United Kingdom.

The exports of wheat from Taganrog for the eight years from 1860 to 1867 inclusive, averaged about one million quarters a year. The prices of hard wheat in 1864 varied from 34*s.* 3*d.* to 37*s.* 6*d.*, and therefore could only have been sold in England at a loss of about 10*s.* a quarter.

The great corn-emporiums of the Black Sea and the Sea of Azoff are Odessa and Taganrog. The former is supplied from Bessarabia and Kherson and the immense tracts drained by the Dnieper and Dniester.

Taganrog commands the fertile territory of which the Don is the outlet. This is the land of the Don Cossacks, a people not remarkable for settled pursuits and agricultural industry; but there is no reason to believe that a Don Cossack can resist the laws of "development," and time may change him into a patient husbandman and follower of the plough! At present each of these great ports sends to the West an average of about one million of quarters of wheat a year.

In 1847, when the prospect of a late deficient harvest sent up the price of wheat in England from 50*s.* to over 100*s.*, the exports from Odessa were doubled. In 1867—one of the worst harvests ever known in England and France—there was a similar demand for corn, and the southern ports of Russia sent to England the unprecedented quantity of 2,900,000 quarters of wheat, including the sweepings of the most distant provinces. The average exports, however, increase but little, and the corn-trade of the Black Sea proves inelastic. Those who accept too literally such phrases as "boundless tracts" and "inexhaustible fertility," may learn from the Reports that the supposed advantages to the corn-grower are often counterpoised by some actual drawback. We are told that steam-power ought to be introduced on the large estates, and that these fertile provinces would outstrip the world, if they had water-communication and practicable roads. The completion of the railway to Kishineff would enable South Russia to supply England with corn at prices which would defy competition. But then we find that fuel is costly, repairs are difficult, and engines liable to blow up under native management; and on completion of this railway we find that the main line must be followed by branch lines, opening up the grain districts generally; after which, and with proper roads—of which there are none at present—it is believed that grain will be shipped at less than one-fourth of its present cost, and Odessa become one of the chief granaries of the world. But the disclosure of the droughts to which the country is subject, "and which will always be an evil," moderates our expectations. Roads and railroads can hardly be built to collect the surplus produce of an immense tract of country, thinly inhabited by a rude population. River and canal navigation is always cheaper than railways, and America is not within the limits of occasional droughts. The reader will remark the low average yield of South Russia, and the rapid exhaustion of "virgin soil." The Consuls' quotations of the price and a statement of the exportations of wheat are given in the Appendix.

Countries of the Mediterranean.

Irrigation, &c.—North of the rainless region of Africa, and including the coasts of the Mediterranean, is a district where rain seldom falls in the summer, the currents of heated air which ascend from the Sahara preventing the formation of rain in the upper strata of the atmosphere. This district includes the coast of Africa, the southern parts of Spain, Portugal, and Italy, the island of Sicily, and the whole of Greece. The general average yearly fall of rain is perhaps 30 inches, equal to that of the

British islands (not including our mountain ranges); but the average proportion falling in the summer quarter of the year is only 4 per cent., instead of nearly a fourth as with us. A waving line drawn across the map of Europe through the countries mentioned, and including the north coasts of the Black Sea, would define the limits of those "occasional droughts," which have been referred to as such great drawbacks to the agriculture of France and South Russia. The annual rainfall on the coasts of Spain is 25 inches, and in some spots 35 inches; while on the table-lands of the interior, surrounded by mountains which precipitate the rain-clouds, the annual rainfall is only 10 inches. The annual rainfall of central and eastern Europe, Moravia, Poland, and Russia is 15 inches. In the west it rains twice as many days as in the east of Europe. Ireland and the Netherlands are the culminating points of precipitation for the rain-clouds of the Atlantic, drifted hither by the prevailing westerly winds. The rainfall decreases eastward and southward. The effects of this abundant moisture are seen in the "emerald" green even of the topmost hills in Kerry, and in the rich pasturage of Holland.

The moisture of our climate is indispensable to natural pastures and to turnips. South of Paris, turf and turnips do not thrive. Spain is only famous for sheep and cattle through the extent of its unploughed land; they pick up a living by ranging widely and migrating according to the season. England is the land of turnips, and of the farming that follows them; and the Mediterranean is the land of dates and grapes, figs and olives. Corn and cattle farming do not find a home under the clear skies of the south; consequently, the countries of the Mediterranean import corn, and, in proportion to their wealth, will continue to arrest the supplies sent westward from the Black Sea or from the rising corn-port of Trieste.

Irrigation is the first step of agricultural improvement in these dry countries. The benefit of carrying off the surplus water from heavy land is as nothing compared with that of leading on water, on dry soils, in a hot climate, because they are absolutely sterile without it. Egypt, without the Nile, would immediately become a desert of sand. When the river rises only a few inches less than usual, the lean kine appear at once. The abandoned works of irrigation are among the traces of departed greatness, so frequent in the countries of the Mediterranean. In Syria, where the scanty population of Turks and Arabs is often visited by famine, "the country, reticulated with canals" for irrigation, shows by what means a teeming population was once supported. Arabia Deserta is a dreary waste of sand, because there are no rivers to fertilise the soil. It was by irrigation that

the Romans, at the period of their agricultural celebrity, grew the artificial grasses which they had introduced from their forerunners in civilisation, the conquered empires of the East. Lucern was cultivated under irrigation in Media, where it is indigenous. It is so cultivated in Spain, and in Italy, where the peasant-proprietors of Tuscany and Lucca co-operate for the irrigation of their little domains. The Greeks were manufacturers of linen, woollen, and silk fabrics in the days of Homer; and they grew the raw products of their industry on irrigated lands, where the crops now too often fail under the visitation of scorching winds and drought.

There is a strip of land of from 80 to 100 miles in breadth, extending 1500 miles along the coast between the Mediterranean and the great desert of Africa. Part of this dry tract was inhabited by the Moors, whose works of irrigation are still decaying in Spain. Algeria was once famous for corn; it is at this moment the scene of fearful famine, through a failure of the crops from drought. Irrigation made these countries productive, and without it the coast of Africa could not be the seat of a modern Carthage, the centre of empire and commerce, which could be fairly described, like its predecessor, as being founded in a fertile country. Agricultural engineering is, however, more costly at the present day than in ancient times, when building a pyramid or cutting a canal across a desert amused the leisure of some Eastern King and used up the captives of his latest war.

While on the subject of water, we may state that the Mediterranean receives 14 per cent. of the running water of Europe; the Caspian Sea, 16; the Baltic, 13; the German Ocean, 13; and the Black Sea, 27, or nearly one-third. The Danube discharges 12 per cent. of the water; the Volga, 14; the Dnieper, ·06; the Rhine, ·03. These figures may be taken to show with tolerable accuracy the proportionate extent of river-basin and of fertile land on the banks of the different rivers. The Elbe, the Vistula, and the Guadalquivir are smaller even than the Rhine, which does not compare with the two great rivers of the Black and Caspian Seas.

SPAIN,

Or rather such small patches of it as could have been under cultivation, was carefully farmed both as a Roman province and by its subsequent conquerors, the Moors, whose works of irrigation, indispensable in a country where the rainfall is small and the soil light, may be still traced. Numberless rivers and streams drain the valleys where the more fertile land is situated. But in this dry and hot climate the grass-lands, excepting those under

irrigation or near the clouds, only afford winter pasturage, and the large migratory flocks of sheep, after wintering in the plains of Estremadura, Andalusia, Leon, and the Castiles, are driven, about the end of April, up the mountain-sides of the Castiles or further north to those of Biscay, Navarre, and Aragon, where, in a cooler and more humid climate, they find green herbage through the summer. The dairies of Andalusia have disappeared, and even Madrid is supplied with goats' milk.

Wines and fruits, silk, and olives, are the rich products of the soil and climate of Spain; her agriculture is exotic. Scotch turnips and mangold wurzel are not suited to Andalusian skies. West Indian plants, the sugar-cane, coffee, and the banana all grow freely on the southern coasts. The pine-apple has been grown in the open air. The date ripens at Malaga. The agriculture of Spain might become superior even to that of France in the value and variety of its productions. Her mineral wealth is also very great, and when the resources of the country are developed under a better government, the importation of wheat will be very large, and Spain may boast a second Marseilles, into which will be poured the produce of Hungary, Wallachia, and the future corn countries of the Mediterranean. Some parts of Castile and the northern provinces generally would grow corn in abundance if there were roads for conveyance, and if the inhabitants were as industrious and energetic and as attached to rural pursuits as the northern races of Europe, and their descendants, instead of being as non-agricultural in their tastes and habits as their Latin ancestors.

Spain is wanting in the means of traffic; the irregular surface does not admit of water communication, and the roads are about equal to ours 100 years ago. Wheat often sells at a low price in a rural district on the spot where it is grown, and at almost a famine price elsewhere. Under the present corn-law it is at a maximum price at the sea-ports, and a minimum in the inland provinces. In 1866 it sold for 24*s.* a quarter in the province of Segovia (Old Castile), and at 80*s.* per quarter at the sea-port of Pavia (Asturias). In the inland provinces of Burgos, Segovia, Soria, and Saragossa, the average price was below 30*s.* per quarter, whilst in those of Alicant, Barcelona, Cadiz, Malaga, and Pontevedra, all bordering on the sea, the price exceeded 50*s.* per quarter. The maximum price of barley on the coast was 42*s.*, and the minimum price inland was 11*s.* 9*d.* per quarter. The population of Spain is 15,600,000; of Portugal, 6,000,000. There is land in Portugal of marvellous fertility, which is said to be capable of growing 55 bushels of wheat per acre, but capital is not attracted to agricultural pursuits. The land is principally possessed by the nobles and by religious corporations,

who, in the exercise of oppressive feudal privileges, have reduced the peasantry to a condition little better than that of absolute slavery.

ITALY.

The southern provinces are fertile, and yield silk, oil, madder, liquorice, cotton, &c., besides wine and grain of all kinds. Maize is eaten by the population generally. The principal corn-producing countries are those bordering on the Adriatic, commonly called the Puglia, and these compete with the Russian provinces for the supply of other parts of Italy. Corn is transported across the Apennines to the towns on the opposite coast on the backs of mules. The hard wheat used in the manufacture of maccaroni at Naples comes from the Puglia. Extensive districts, supposed to be well adapted to the cultivation of cotton, are lying unreclaimed, especially in the province of Basilicata. The capital for agricultural enterprise and for roads and railways is not yet forthcoming. Corn is sometimes exported to Marseilles and England, but not in large quantities. Imports from the Black sea are the rule.

The plains of Piedmont and Lombardy, sloping from the Alps to the Adriatic, and watered by the Po and its affluents, though famous for agriculture, are not self-supporting as regards corn, and there are usually extensive importations of wheat and maize at Venice, from the Black Sea and the Danube.

Corn is also imported for the supply of the towns on the opposite sea-board.

TURKEY IN ASIA.

Among the existing remains of ancient empires that once flourished in Turkey are the canals for irrigation. The only conditions for raising every description of grain are the supply of water and the means of irrigation. At present, cultivation, like the fixed population, is restricted to the neighbourhood of towns and villages, situated on the great trunk roads, and to canal-irrigated districts, which are very limited in extent. The intermediate country is occupied by the great nomad tribes, who never engage in agriculture, and by the half-settled Arab communities who shift their place of abode continually within certain limits, and only raise sufficient grain for their own consumption. But sun and sand, and the need of water, are not everywhere excessive: the finest pastoral countries in the world are those rich alluvial plains in the eastern portions of Turkey, watered by the Euphrates and the Tigris and the numerous rivers of Mesopotamia. The climate is genial,

and in past times was famed for its salubrity. At the present time fever, diarrhœa, and dysentery are more or less prevalent according to the proximity of the extensive marshes which form the peculiar features of the extensive tract of country through which the Euphrates winds by more than one channel. In dry seasons the great river is swallowed up by these marshes. The obstacles to industry are the wretched social condition of the inhabitants and the general insecurity arising from the weakness of the administration, the power of the Arab chiefs, and their constant dissensions. The predatory tribes of Arabs, in the districts most frequented by them, wander about the great plains and make them dangerous and inaccessible to honest settlers. Four-fifths of the land is the property of the crown, and is let in large parcels and sublet on a vicious principle, without security of tenure. Works of irrigation are consequently everywhere precluded. The fellahs, or peasant proprietors, and farmers, are universally in debt.

The crown lands are devoted to cereal produce; the private lands and life grants consist for the most part of date-plantations, orchards, and kitchen-gardens. The implements of farming are the plough, the spade, and the hoe. Corn is trodden out by oxen, and water for irrigation is raised from the river by skins drawn over a roller by oxen, or horses, working up and down a ramp. The price of wheat varies according to locality and distance from the towns. The average for the last five years at Bagdad was 29*s.* a quarter. In 1863 it was 40*s.*

North of the province of Bagdad are Diarbekr, Kurdistan, and the northern provinces. These are rich in natural resources; the rich valleys and well-watered plateaux are sheltered by the mountains of Armenia, and watered by the Tigris and numerous other rivers. The rivers never fail, and they abound in fish. The climate is equable and agreeable, free from extremes of heat and cold, and healthy to Europeans. The plains and uplands are rich in pasturage throughout the year, and consequently they are superior beyond comparison to the arid sheep runs of Australia. The arable land is equally fertile in corn and native fruits. Luscious sultana grapes, equal to those of Smyrna, peaches, and plums, the largest and finest flavoured in the world, grow in profusion in the northern districts. Nuts, walnuts, almonds, pistachio nuts, and button nuts thrive everywhere in the upper provinces. This would be a land of fruits, preserves, and sweetmeats, as well as of corn and wool and cotton, if the inhabitants possessed skill and industry. But the cultivation is the laziest that can be conceived. The cotton might rival that of any other country in price and quality if careful cultivation and Arab tribes could co-exist in the same land. These erratic traders

monopolize the wool trade; in other words, they bring it to market when they are inclined and are not in a state of quarrel with the government. In spite of the popular belief in their integrity, the Bedouins are the most dishonest people to deal with in the world.

The western portion of Asia Minor is also shorn of its former greatness. Here was the kingdom of Crœsus, King of Lydia, and on the coast of the Ægean Sea were those famous cities, Troy, Ephesus, and Sardis, whose names recal the history of former power and wealth. The resources of the country are great. Among the products of cultivation are silk, cotton, wine, maize, sugar, and every kind of grain.

A small quantity of wheat is sometimes sent to Marseilles and Egypt, but quite as often there are fears of famine at home. Locusts and the Turkish government are the great impediments to prosperity. Labour and provisions are low in price, but flour and manufactured articles are not so. The quotations, however, are in a debased currency. The "murrain" sometimes attacks the cattle, and leaves localities and individuals destitute. The disease is rarely fatal to buffaloes; and the unhappy Turks have merely to contend against cholera and famine. A Turk, with turban, pipe, and slippers, is a firm believer in destiny, and Providence, he thinks, did not destine him to labour. The population of Turkey in Asia is said to be thirteen millions; the area, four times that of Great Britain and Ireland. Industry alone is required to restore the former prosperity of these rich historic countries; and when the Turk ceases to rule, their old fertility may return.

Egypt.

Alexandria used to send us a considerable quantity of wheat and of beans, mixed with a large proportion of dried nodules of Nile mud; of late years the river has overflowed for cotton and crops more profitable than corn. But since the fall in the price of cotton, Egypt has again become an exporter of grain.

The other Corn Countries of Europe.

South of the Carpathians the principal tracts of fertile land may be traced in broad belts marked by the course of the Danube and its numerous tributaries. This great river rises in the far west near the sources of the Rhine, flows through the most productive countries in Europe, and falls into the Black Sea, after a course of nearly 1500 miles, including the windings of the stream, or nearly 900 miles of direct distance. The Main

Canal links the Danube to the Rhine, and thus completes the great thoroughfare, and makes it continuous from Odessa to the German Ocean. The plains of the Danube, in Hungary and Bavaria, are among the richest in the world. The agricultural resources of the former country are unsurpassed. Mr. Bonar, Secretary of Embassy at Vienna, in an account of the industry of Austria, in 1867, writes as follows:—"Hungary with its dependencies is traversed by a whole network of broad and powerful streams all verging to one great artery, the Danube, and some of which have been again connected by canals. The principal commerce and trade of Hungary consists in raw produce derived from the vast plains bordering the numerous rivers. The Waag, Gran, Theiss, and Maros, furnish the lowlands with timber, minerals, and other products of the Carpathians, and carry them, together with grain, &c., to the Danube ports. The Franzens Canal, traversing the fertile districts of Baczka; the Bega Canal, with the corn-harvests of the Banat; the Drave, bringing the produce of the iron industries of Carinthia and Styria; even the diminutive Temes stream and the Save all combine to raise the traffic of the watercourses of Hungary to the highest importance."

The population is about 8,000,000, and the growth of corn as follows:—Wheat, 5,000,000 quarters; rye, 4,000,000 quarters; barley, 4,700,000 quarters; oats, 6,300,000 quarters; maize, 3,300,000 quarters. This is about 9¼ bushels per acre for the whole of the arable land, and if one-half of it is in corn every year, the average yield is 18½ bushels per acre. There are 4,500,000 acres of pasture, 4,500,000 acres of meadows and gardens, 1,500,000 acres of vineyards, and 15,900,000 acres of forests. The number of sheep is 15,000,000. Some of the finest cattle in Europe are bred on the luxuriant pastures. Swine are numerous in the forests; while herds of bears and wolves and wild fowl swarm in the lakes and marshes: bustards frequent the plains, and birds of prey the wilder parts of the country.

The climate is favourable in the south, on the plains of the Danube; here snow seldom lies many weeks; the lemon and orange blossom all the summer, fruit and wine are abundant, and the tobacco is nearly as good as in America. In the north, under the snow-capped Carpathians, winter lasts till May or June. Here are rich mines of iron, lead, copper, and coal; but manufactures are not yet important; and the exports, which are chiefly of produce, exceed the imports by one-third.

States of the Zollverein.

The States comprising the German Customs Union will have a great influence on the future corn-trade of Europe; we there-

fore preface our remarks with statistics of their population. The last census was taken in December, 1864, and shows the following results:—

	Population.
Prussia *	19,642,954
Luxemburg	202,937
Bavaria	4,813,076
Saxony	2,343,994
Hanover	1,943,772
Wurtemburg	1,748,328
Baden	1,426,218
Hesse-Cassel	716,889
Hesse-Darmstadt	871,839
Thuringia	1,103,530
Brunswick	268,523
Oldenburg	244,407
Nassau	468,311
Frankfort-on-Maine	92,244

There is a complete system of agricultural statistics in these States, and all that information, utility, or even curiosity, can suggest, is afforded in a great array of figures. The figure 1 is taken to represent an average harvest, and the decimal proportions of that figure are used for the purpose of comparison; thus the bad harvest of 1865 was represented by 0·78; the ten years ending 1865 were written 0·91, viz. 9 per cent. under an average. The same mode of comparison is applied to each crop, as well as to the whole harvest.

Saxony.—This little kingdom has always been a model of good cultivation, since the time when the wool of Saxony was the finest in Europe. The population has rapidly increased, no country in Europe being more densely peopled. Agriculture is the source of wealth, and embraces a great variety of crops of more value than corn, including the vine, which is very carefully cultivated.

In the province of Saxony the same productive system of farming is followed. It is the best cultivated part of Prussia, and is too far advanced for the exportation of corn generally. The fine barley grown on the banks of the Saale is an exception. The best part of Prussian Saxony is Magdeburg, a fertile level tract. Merseburg and Erfurt are equally well cultivated, but the soil is not so rich. Cattle are imported from Hungary, Galicia, and Podolia.

Hanover and Mecklenburg, which are near the coast, have the advantage of situation, but not of soil, the former is generally poor. Instead of corn-fields and cultivation the country is covered with marsh, bog, moor, heath and sand, lake and forest. Fertile land is the exception.

* The territory acquired by the war adds 4,336,154 to this number.

Westphalia is similar in character, being also within the limits of the great plain of North Germany, except the southern half, which is covered with small mountain chains, offsets of the Hartz.

Wurtemburg, formerly agricultural, has, within the last 15 years, become one of the German manufacturing States. The mineral products are iron and salt, and the native manufactures are those of cotton, linen, wool, and the working of metals. These trades have absorbed labourers, to the injury of the landed proprietors. Rents have fallen, and farmers have turned their attention to the production of meat, hops, flax, beet-root, and wine, instead of cereals. Corn is imported from Hungary in increasing quantities, and more cattle are raised in Wurtemburg in proportion to its area than in any other German state except Bavaria. The following is the estimated number of cattle, per square mile, according to German statistics:—Bavaria, 662; Wurtemburg, 552; Hanover, 495; Prussia, 303.

Prussia.—We extract the following from a recent Report by Mr. Lowther, Secretary of Embassy at Berlin:—

Prussia is one of the best peopled countries of Europe. The increase of population since 1816 has been far greater than that of France and Austria, and almost on a par with that of Great Britain and Russia. The consumption per head, per annum, was then estimated at 4*l.* 10*s.*, at the present time at 6*l.*; so that the inhabitants of the old Prussian provinces must produce 69,000,000*l.* more than they did in 1816. The woods and forests, especially in the provinces of Brandenburg and the Rhine, are very extensive, occupying one-fourth of the area of the old provinces of Prussia. The agriculture is very varied; the vine and tobacco covering a large area. The cultivation of hops has greatly increased, especially in Posen, and the growers have made large fortunes. Various plants are grown for oil, colour, flavour, and for textile fabrics; fruit-trees are much cultivated in the valleys of the Rhine, in Saxony, Brandenburg, and Silesia. Silk-worm culture has been recently much encouraged. The number of bee-hives is estimated at more than 1,000,000! The new territories are chiefly agricultural, and the breeding of cattle is more considerable than in the old territories, where manufacturing and commercial industry are more general. The number of animals in all Prussia, according to the last list, is about 6,600,000 oxen, 22,000,000 sheep, and 4,000,000 pigs, besides 2,200,000 horses.

There has been a great increase in mining industry, especially that of coal and iron, in consequence of railway and manufacturing demands. Prussia is rich in minerals and coal, and her various factories are increasing and thriving. Agricultural ma-

chines, which formerly came from England, are now made to a great extent at home. In a variety of manufactures Prussia has gained ground, and in some instances has outstripped this country. Textile industry has also greatly extended; the weaving of cotton flourishes wherever wages are low, as in Saxony, Silesia, and Westphalia, and especially in the Thuringian districts. Woollen manufactures have lately attained a superiority which has extended their sales to all parts of the world.

The manufacture of sugar from beet-root bears still more directly on the question of agriculture. This trade has met with the same enormous development in Prussia as the manufacture of spirits from beet in France. Eight times as much sugar is manufactured as in 1844; the home consumption has increased from 5 lbs. to 10 lbs. per head per annum; and the exports are very large. The distillation of spirit from potatoes, on the larger farms, is also an increasing business. The spirit is exported to England, France, Spain, Portugal, &c., and much of it "finds its way" into wine, and is used in the manufacture of liqueurs.

Of the total value of the exports about 52 per cent. fall to manufactured goods, and 19 per cent. to articles of daily consumption, chiefly the products of agriculture. The amount and description of the imports are signs of the wealth of the country and the progress of its industries.

Bavaria.—The growth of wheat amounts to about 6 bushels per head of the population. The exports of manufactured articles already greatly exceed those of raw produce. This is a manufacturing country, highly favoured in soil and climate. Wine is grown on the Saale, in the Palatinate and in Franconia; hops and tobacco in Franconia and Swabia. Among the agricultural products are sugar from beet-root, hemp and flax in increasing quantities, rape and linseed oil, silk, madder, on the Main, and a variety of flavouring and colouring and other seeds and plants. This sort of farming used to be carried on at Coggeshall in Essex, and in other districts, where a lucky crop of onion-seed was worth more than the fee-simple of the land twice over, and carraway and coriander growers flourished independent of the price of corn; but since the alteration of our tariff, seed-farming has found a home in the plains of Germany, where the climate is more favourable. There are good pastures on the banks of the streams and rivers. This is the chief cattle-rearing State in Germany, especially on the mountain pasture of Swabia and Jpper Bavaria. We need hardly add that the hops and beer are famous. Very little corn finds its way to the coast, the only available channels for heavy traffic being the Main and Danube Canal, the Lake of Constance, and the Rhine, by which means

corn is received from the Austrian States, and is exported to France and Switzerland; but the grain trade is inconsiderable.

Austria.

We learn from Mr. Bonar's Report that the usual markets for the produce of rye, pulse, and other grains, are Italy, France, England, and Greece. Oats are imported from the "rich plains of the Danube in Bavaria;" maize from Bessarabia, and large quantities are exported from other parts of the empire. Sheep are exported to Hamburg, and imported from Bosnia, Servia, and Wallachia.

The exportation of fat bullocks to England and France, which is greatly increasing, amounted during the past 12 months to 175,000 head, worth 20*l.* each. These animals are sent by special trains to the North German seaports, and thence by quick-sailing vessels. They are chiefly from Moravia and Bohemia, and are fattened on the refuse of sugar and spirit manufactories.

The principal cattle-breeding districts of Austria are Hungary and Transylvania. The total number of horned cattle in Austria, according to recent statistical returns, is 13,600,000, including 6,100,000 cows.

Bohemia is the chief seat of manufactures in the Austrian territory. Locked up among the mountain fastnesses of Germany, with only one outlet by the Elbe, Bohemia does not contribute much to the wants of other countries. The growth of corn is stated at 1,200,000 quarters wheat; 3,000,000 quarters rye; 1,700,000 quarters barley. Population, 4,500,000. Cattle are imported from Poland.

Galicia

Is also "behind the mountains." It is a fertile and an old-exporting country, but too distant to send wheat to the coast in ordinary times; the population is about the same as that of Bavaria; the growth of wheat is about one-half, that of rye less, and of barley more: oats and potatoes are grown in large quantities.

Norway and Sweden

Are both agricultural countries with resources limited by their northern latitude. The former, as will be seen by the Report in the Appendix, imports a large quantity of corn, as also do the northern countries of the Baltic generally, where the rigour of the climate is adverse to agricultural pursuits, and but little wheat is grown. The poverty of the people of these regions prevents their buying much besides the inferior grains.

Northern limit of Wheat Cultivation.

The northern limit of the profitable cultivation of wheat in Russia is at about the latitude of Petersburg, viz. 60°.

The saxonka, and other kinds of superior red wheat from Petersburg, so esteemed at Mark Lane, are grown in the Baltic provinces south of the capital. The limit of cultivation extends further north on the Atlantic shore, under the influence of the Gulf stream.

Belgium,

Like other manufacturing countries, also imports corn, as do Hamburg and the Hanse Towns, and, in fact, any portion of the poorer seaboard of the German Ocean where a considerable population is collected.

When the Dutch were the carriers of the world, Rotterdam and their coast towns were the emporiums for the corn of other nations; and corn was always abundant in Holland, though little was grown there. Now, this industrious people have become essentially agricultural, and, in addition to their famous pastures, they manage to cultivate enough corn to diminish their necessary imports from year to year.

America.

Of America we shall say but little; because, when considering the vast extent and great resources of the country, we seem to be approaching the illimitable and unknown.* Before the war she exported largely in good years. A slight variation in yield over a great area gives a large aggregate difference. America has sometimes had a large surplus, and sometimes barely enough for her own wants. In 1862, the United States exported to England about five millions of quarters of wheat and flour against less than a hundred thousand quarters in 1859. More recent deficits were owing to the interruption of cultivation during the civil war, and to the bad wheat-harvests of 1864 and 1865. The average yearly exportations of wheat and flour to this country from the United States for the eleven years including 1867 were 1,824,000 quarters, and for the eleven previous years 1,053,000 quarters. The increase is partly due to Canadian corn,

* After remarking on the low average yield of wheat in the new States, which he thought did not exceed 12 or 13 bushels, while in Ohio, supposed to be the most productive State, it was only 15¼ bushels, Mr. MacCulloch gives his opinion that "at no very distant period the exports of wheat and flour from the United States will, if they do not cease altogether, become comparatively inconsiderable."—*Geographical Dictionary*, 1854.

grown in the West, and now brought through the United States by the Erie Canal and Hudson river.

In the countries we have been considering we find a comparatively exhausted soil, with a low average yield, which can only be increased profitably by an increase of population, the extra mouths consuming the increased produce. In America circumstances are entirely different. Population is increased by immigration; new tracts of land are broken up by new settlers, who "reckon" to supply the wants of the New and the Old World. The average produce is small; because the land, though rich, is roughly cultivated and over-cropped. It is a system of spoliation. As the great centres of population become larger, such sources of supply must become more variable and uncertain.*

Prices.

The earliest predictions of Mr. McCulloch, forty years ago, that the price at which corn could be obtained would not, in ordinary years, be less than 50*s.* a quarter, and would most likely range from 52*s.* to 57*s.*, have been verified. It is remarkable that steam-conveyance, which has opened up the most distant tracts, and brought them, it may be said, so much nearer our shores—to say nothing of special improvements in agriculture—should have had so little effect that the average price of wheat for the twenty-one years since the repeal of the corn-laws has been 53*s.* per quarter.

The opening of the English ports to corn widened the area of cultivation both in the Old World and the New. It was the signal for an army of settlers—the outposts of civilisation—to march further into the wilderness to subdue it. Many an American pioneer shouldered his tools, the weapons of a peaceful conquest, and marched into the Far West to use them in patient warfare with the forest and the prairie. And in the central plains of Europe the territorial lord, proud of his vast though wasted possessions, began to organise their subjection to the plough, with England as a market for his produce. The steam-engine, and the more complicated machines of tillage, have found their way to the plains of Egypt, and to the ruder regions watered by the Volga or the Dnieper. The Russian and German peasant have learned the use of labour-saving machines, and in doing so have acquired the means of a double cultivation—that

* This paper, accidentally deferred, was commenced when wheat was 40*s.* a quarter. Our intention was to show that, whatever the resources of English agriculture might be, foreign countries would not continue their supplies at any such price. This was certainly true of America before the war. The future cost of production cannot be less.

of the soil and of the humble tiller of the soil, in whose mind is implanted the desire for improvement. Trade thus extends the influences of wealth and civilisation into remote corners of the world, and distributes increased comfort and happiness among mankind. Increased wants accompany the general progress, labour rises, the cost of production increases, and the low prices of a ruder age pass away. Prices rose from these causes, in this country, from the middle of the last century; a similar rise has commenced, and will no doubt continue, in some countries which have entered later on the path of advancement. That the price of corn should be maintained at a period when one-third of that brought to market is of foreign growth is what none could have anticipated thirty years ago.

A variety of details on the price of growing corn in Europe were laid before the Agricultural Committee of the House of Commons in 1821; and Mr. Jacob's "Report on the Trade in Corn and on the Agriculture of the North of Europe," printed by order of the House of Commons in 1826, is still a standard authority. This gentleman was employed by the Government to investigate the capabilities of the various corn countries, their soil, the average yield of corn, cost of production, and the means of transit.

The average price of grain per quarter, free on board at Dantzig, was—

	Wheat.	Rye.	Barley.	Oats.
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
From 1770 to 1779	33 9	21 8	16 1	11 1
,, 1780 ,, 1789	33 10	22 1	17 11	12 4
,, 1790 ,, 1799	43 8	26 3	19 3	12 6
,, 1800 ,, 1809	60 0	34 10	25 1	13 1
,, 1810 ,, 1819	55 4	31 1	26 0	20 4
Average price for 49 years	45 4	27 2	20 10	13 10

The average price at which a quarter of wheat grown near Dantzig could be put on board ship at that port was stated to be 35*s.*, and the cost of freight, insurance, unloading, and warehousing was 8*s.* But in case of an active foreign demand the price would immediately rise; as any considerable supply could only be derived from the more distant and fertile districts of Galicia, Volhynia, Moravia, and Massovia. The lowest price at which corn could be produced, "if land could be had for nothing, and reckoning upon no casualties, such as a failure of

the crop, extraordinary taxes, &c., would be," wheat 31*s.* 9*d.* per quarter, rye 15*s.* 10*d.*, barley 12*s.* 8*d.*, oats 9*s.* 6*d.* To this must be added, according to the distance and description of the grain, from 4*s.* to 6*s.* a quarter for bringing it to market (at Dantzig). This estimate, however, applies to the vicinity of Dantzig; the cost of transit from all provinces south of Warsaw would be much greater, as appears from the following estimate :—

	s.	*d.*
Cost of wheat at Warsaw, per quarter	28	0
Conveyance to the boats, charges for loading, stowing, and freight to Dantzig	5	6
Loss on the passage by pilfering, and rain causing it to grow	3	0
Expenses at Dantzig, turning, screening, warehousing, and loss of measure	2	0
Profit or commission to merchants at Dantzig	1	6
Freight, primage, shipping, charges, and insurance at Dantzig and in London	8	0
Cost of the wheat to the English merchant	48	0

To which must be added the risk from heating on the voyage and, at the present day, the 1*s.* duty. Any unusual demand would raise the cost of freight on the Vistula 30 or 40 per cent. The usual cost of freight from Dantzig to various ports of the United Kingdom is 3*s.* to 5*s.* per quarter in sailing-vessels, and 1*s.* per quarter more in steamers. The cost of freight from the Upper Vistula to Dantzig, in 1865, was 3*s.* to 6*s.* 6*d.* per quarter, and from the Lower Vistula 2*s.* to 5*s.* per quarter.

The decennial average price of wheat at Rostock for the ten years from 1855 to 1864 was 46*s.* 8*d.* per quarter. The consular reports from Dantzig in 1864 mention the distress of the German farmers, and the impending bankruptcy of many of them during the period when low prices prevailed in the overstocked markets and Western Europe.

The total charges on Black Sea wheat sold in London, including freight, duty, and insurance, are not less than 16*s.* a quarter; and more if grown far inland. On American wheat the charges are about 10*s.* a quarter, at the average rate of freight, exclusive of land-carriage. The charges for importing 5 quarters of wheat grown on an acre of "virgin soil" in South Russia would pay the rent and taxes and part of the labour-bill of land in England that yields as much corn, besides meat.

The incidental expenses of the home-grower are small; he delivers the corn at the mill, in his own waggon, at leisure times, at less than the cost of landing charges, to say nothing of the 1*s.* duty and the commission on the sale. English farmers must expect an increase in the cost of labour, but the movement

in this respect is European. Even the Russian labourer claims wages, instead of the miserable payments in kind which he received in the days of serfdom. In those parts of Germany where large estates are badly farmed, the condition of the labourer must either be improved or emigration will continue and cultivation become still worse.

A scarcity of labourers in impoverished corn-districts abroad is more injurious than in England, where the use of machines and implements saves labour, and by the care they require educates the labourer and increases his efficiency. Improved agriculture, which permanently increases the value of the land, requires an outlay which cannot be incurred except in a thickly-peopled country where capital is concentrated.

The rate of wages rose from 6*s.* per week in the middle of the last century to 9*s.* at its close. It has been calculated that a fair day's wage was the value of a peck of wheat, viz., 10*s.* a week at 53*s.* per quarter, and 7*s.* 6*d.* at 40*s.* per quarter; this, however, was exclusive of the additional pay in haytime and harvest; but this calculation has become obsolete, as increased pay is allowed in the use of machinery, task-work is more general, and wages have risen.

Thaer's estimate for the German labourer, sixty years since, was the value of three pecks of rye a week. Women were then constantly employed in field-work, in cultivation generally, and in stock-feeding. "A maid-servant is allotted to every ten cows, and she is expected to feed them and carry away their dung." "A woman spreads an acre and a quarter of dung a day, and a man one and a half to two acres."

The various consular reports, as well as our sketch of French agriculture, confirm the accounts of the average cost of production abroad. The following is a curious calculation of the effect of a deficient harvest in raising the price of corn:—

Deficiency of crop:—

0·1		0·3
0·2		0·8
0·3	Raises prices	1·6
0·4		2·8
0·5		4·5

Mr. Tooke, in his 'History of Prices,' observes, "No such strict rule can be deduced, but there is some ground for supposing that the estimate is not very wide of the truth," when the deficiency has not been relieved by foreign supplies.

The large imports of wheat and flour in 1860, 1861, and 1862 (average 9,150,000 quarters per annum) did not depress prices below an average of 53*s.* 6*d.* to 55*s.* 6*d.*; the moderate imports of 1857-8-9 (average 4,780,000 quarters per annum) did not

prevent prices from falling to an average of 48*s.* 1*d.* for the three years, and to 44*s.* for the last two years; our own growth being very great.

Average prices of Wheat.

		£.	s.	d.
For 10 years ending and including	1770..	2	1	9
" 10 " "	1860..	2	14	9
" 10 " "	1850..	2	13	3
" 40 " "	1800..	2	9	8
" 40 " "	1860..	2	16	9
" 20 " "	1820 (war prices) ..	4	6	0
" 50 " "	1800..	2	7	4
" 50 " "	1867..	2	16	5

Production and Consumption, &c.

Formerly, when neither farmers nor dealers had capital to withhold corn from market, and when forestalling, engrossing, and regrating were forbidden by law, corn was squandered by the consumers in proportion to its abundance and cheapness, and the result was scarcity and often absolute famine before harvest; prices were four or five times higher in June and July than in September and October; and the reaction was also greater, from the dependence of the people on bread-corn. The improved diet of the people and the greater variety of their food helps to equalise the demand. Instead of a wasteful consumption in years of great abundance, the bulk of the people—all but the poorest—consume less bread when it is very cheap than when it is at an average price. The proportion of the weekly wage allotted for dear bread is large, and the balance left for distribution among other articles is, of course, proportionately small; but when the loaf falls to 6*d.* the mechanic, if well employed, becomes a much more dainty feeder: he buys less bread and spends more on animal food. The butcher finds him among his best customers for beef and mutton. It is a baker's complaint that, "when bread is cheap, they don't ask whether the loaf is new, but whether it is hot; and if it is not, they return it to the counter, with the remark, 'You may eat it yourself!'"

The history of the corn-trade is the history of English agriculture. We refer to it briefly, in order to trace the progress of agricultural production. During the five hundred years succeeding the Conquest, importation was practically free: these were the dark ages of agriculture, and, small as was the population of the country, its productive industry was insufficient for its supply. But in the prosperous reign of Elizabeth peace and security had turned the scale; corn began to be exported, and it

was thought necessary to impose a duty on exportation amounting to 2*s.* a quarter on wheat and 1*s.* 4*d.* on other grain, and exportation was to cease when the price of wheat rose above 20*s.* and that of barley 12*s.* per quarter. During the next century several other Acts were passed with the same object of checking exportation. In the time of William and Mary a totally new principle was introduced; and in the exercise of a paternal and not very impartial spirit, and for the succour of agriculture, a bonus was given on all corn exported. At first the bounty was 5*s.* a quarter on wheat, 2*s.* 6*d.* on barley, malt, and oats, and 3*s.* 6*d.* on rye; but the bonus was only granted when prices were as low as 48*s.* for wheat, 24*s.* for barley and malt, 32*s.* for rye, and 15*s.* for oats. Exports of corn were almost continuous for the first sixty-six years of the last century, reaching, in 1750, to 947,000 quarters of wheat only. For the ten years ending 1751 the bounties paid amounted to 1,515,000*l.*; but the increase of the population soon turned the scale. At the time of the Peace of Paris, in 1763, the seeds of our manufacturing and commercial industry may be said to have been sown. Ten years later the exportation of wheat was prohibited, when the price rose to 44*s.* Its importation soon became common. An Act was passed in 1773 allowing foreign wheat to enter at a nominal duty of 6*d.* a quarter when the home price was at or about 48*s.* Except in very productive years and during the disastrous period of the American War, wheat was regularly imported; and with the revival of trade at the close of the century England ceased to export corn.*

In 1760, "the average annual produce of wheat," according to Mr. Comber, 'On National Subsistence,' was about 3,800,000 quarters, of which about 300,000 had been sent out of the kingdom, leaving 3,500,000 for home consumption. In 1773 the produce of wheat was stated in the House of Commons to be 4,000,000 quarters, of which the whole and above 100,000 quarters imported were consumed in the kingdom. In 1796 the consumption was stated by Lord Hawkesbury to be 500,000 quarters per month, or 6,000,000 quarters annually, of which about 180,000 quarters were imported, showing an increased produce, in about twenty years, of 1,820,000 quarters.

These comparisons show the increase in the production of wheat which took place at that period of our agricultural

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* During the latter half of the eighteenth century the English and European harvests were much less productive than in the first fifty years. A cycle of bad seasons also occurred during the continental war. The rise of prices in the last century was occasioned by unfavourable harvests and by increased population; the "war prices" would have been less extreme if the seasons had been favourable.

history, owing to the general improvement of agriculture and the large addition to the number of acres under cultivation; nearly three million acres of land having been enclosed under numerous Acts of Parliament from the beginning of George Third's reign to 1797; while in the three preceding reigns the area of the enclosures had been less than 340,000 acres. This was a period of commercial and agricultural progress, of free trade in corn and of moderate prices, the general price of wheat being between 40*s.* and 50*s.* a quarter, and the extreme prices 26*s.* 9*d.* in 1761, and 81*s.* 6*d.* in 1795.

It was at this period that the governing class destroyed the principles of free trade in corn, which had been long maintained in England. In 1791 the first measures of restriction were passed, and for the next thirty-five years the corn-laws were the subject of incessant legislation, always with a view to the protection of British agriculture and raising the price of wheat. There were, however, one or two bills of indemnity to Ministers who had been compelled, as in 1826, to let in a little foreign grain, under Orders in Council, to avert a famine. During the war the price of wheat was enormous: for the ten years ending 1805 the average price per quarter was 81*s.* 2½*d.*; and in the ten years ending 1815 the average had risen to 97*s.* 6*d.* Under the influence of deficient crops and depreciation of the currency, the average prices of the years 1812 and 1813 were respectively 128*s.* and 120*s.* per quarter. At the close of the war a ruinous reaction took place, and with it agricultural distress, parliamentary inquiry, and a great amount of evidence and reporting on the state of the corn-trade, with examination of eminent agriculturists. These witnesses were unanimous that, at the then present prices (70*s.* to 80*s.* per quarter), the poor land broken up during the war must go out of cultivation. They differed as to the lowest limit at which foreign wheat might be admitted free of duty: some thinking it could not be safely admitted while the home price was under 120*s.*, while others put the limit at 80*s.* to 90*s.*, and some ventured as low as 70*s.* In 1815, Mr. Robinson passed a bill excluding foreign wheat when the price was below 80*s.* per quarter; but the price continued to fall, and in 1821 there was more distress, followed by more inquiry and the reduction of the limit of importation to 70*s.* a quarter. In 1826 came a drought, and a rise in prices from natural causes. Deficient crops in 1829 and 1830 caused large importations, with an average price of 65*s.* a quarter. Then came six abundant harvests, with a cessation of importations and a reduction of price in 1835 to an average for the year of 39*s.* 4*d.* per quarter. The occasional agitation of the industrial classes on the subject of the corn-laws was now hushed for a

time, and it began to be thought that improved agriculture had permanently raised the rate of production. But this vision, so often entertained, was found to be baseless. In 1842 the harvest was deficient for the sixth time in succession. At the appearance of the lean kine the Anti-Corn-law League had started up in Lancashire. Then came the trial of strength between the producers and consumers; the former were still the most powerful party in the legislature, but the numbers out of doors could not be refused, and an accidental scarcity of food from the potato-disease and failure of the crop in Ireland in 1845 decided the struggle. In 1846 Sir Robert Peel carried his measure for immediate alteration of the corn-laws with their total repeal, to take effect on the 1st of February, 1849.

The annual consumption of wheat in England and Wales has usually been estimated at 1 quarter per head of the population. The data on which this estimate was founded were the result of many careful investigations, in 1765, by Mr. Charles Smith, author of 'Tracts on the Corn Trade,' and these were confirmed by inquiries of the Suffolk magistrates in forty-two parishes in 1795 and 1796.

In France, M. Paucton's estimate of 10 bushels (reducing all corn to the standard of wheat) seemed to confirm our own figures; as the French were known to consume more bread and less animal food than their English neighbours, the south of France hardly producing any meat. Probably neither of these estimates applies now to the better-fed population of the two countries.

Sir F. W. Eden stated that, in 1796, the family of an agricultural labourer—taking 65 families in different parts of England—consisted of an average of 5¼ persons, and their yearly expenditure was found to be—

	£.	s.	d.		
Provision	27	1	8	....	74 per cent.
Rent	1	13	3	....	4½ "
Fuel	2	10	7	....	7 "
Clothes and washing ..	4	18	0	....	13 "
Contingencies	0	10	10	....	1½ "
	36	14	4		100

In the family of a well-paid mechanic there is always bread enough, and the item "provision" includes less of it and more of other articles of diet; and the consumption of meat increases in proportion as wages rise above the sum actually needed for mere maintenance. It was very aptly remarked by M. Léonce de Lavergne that Arkwright and Watt must precede Bakewell!

There are no exact data as to the production and consumption

of this country; but by comparing the estimates of the best authorities with the increase in importations and in population we obtain considerable insight, and can safely infer that the public diet improves and requires a continual increase in the supply of animal food, and that English farming is not now progressing, in the direction of meeting the demand, so fast as could be desired.

We shall trouble the reader with as few figures as possible. The following statistics will, perhaps, be sufficient for reference.

ACREAGE and ESTIMATED PRODUCTION of GRAIN of the UNITED KINGDOM, according to the AGRICULTURAL RETURNS in 1867.*

Kinds of Grain.	Acres.	Production per Acre, after deducting for Seed.	Total produce in Quarters.
		Bushels.	
Wheat	3,640,925	26	11,833,006
Barley	2,439,947	30	9,149,801
Oats and rye	4,482,616	32	17,930,464
Beans and peas	868,452	26	2,822,469
Total	....	....	41,735,740

In Scotland and Ireland there has been a considerable change in the proportions of arable and pasture in the last ten years. The area in wheat in 1857 was respectively 243,240 acres and 544,348 acres; it is now 110,609 acres and 280,549 acres. This represents a reduction of about 1,200,000 quarters, or an eighth of the available growth of the United Kingdom. The area of oats and barley in Scotland has slightly increased. In Ireland the two million acres of oats have been reduced by 329,632 acres. Potatoes, now one million acres, have fallen off 100,000 acres. In England there has been a similar but less startling conversion of arable into pasture, which cannot be ascertained for want of statistics.

IMPORTATION OF FOREIGN CORN INTO THE UNITED KINGDOM.

The average yearly importation for the seven years ending with 1852:—

* As these Returns are only reproduced here for the purpose of general comparison, it is not considered necessary to replace them by those of last year.

	Quarters.
Wheat and flour, reduced to quarters of wheat	4,231,185
Barley	870,786
Oats and oatmeal	1,162,546
Rye	99,510
Peas	173,393
Beans	393,366
Total (Maize not included)	6,930,786

The average yearly importation for the eight years ending with 1860:—

	Quarters.
Wheat and flour, reduced to quarters of wheat	5,100,000
Barley	993,000
Oats	934,000
Rye	58,000
Peas	155,000
Beans	362,000
Maize	1,489,000
Total	9,091,000

The average yearly importations of corn for the seven years from 1861 to 1867 inclusive:—

	Quarters.
Wheat and flour, reduced to quarters of wheat	7,960,000
Barley	1,510,000
Oats	1,570,000
Rye	48,000
Peas	290,000
Beans	384,000
Maize	2,430,000
Total	14,192,000

In 1860, 1861, 1862, and 1863, the exports of wheat from Russia, Prussia, and the United States were very large, the latter country sending us as much as Russia and Prussia together. In 1864 and 1865, the imports of wheat from these two countries remained about stationary; those from America and Egypt fell off. The great exports of wheat in those four years, both from Europe and America, were owing to the exceptional abundance of the harvests abroad and to our bad crops in 1860 and 1861. As long ago as 1853, Prussia figured for nearly as large an export of wheat to England as in the recent great years, viz., more than a million quarters. In 1856 her exports dropped to about 200,000 quarters. So extreme is the variation in yield. The supplies from the northern ports of Russia, since the Crimean war, have been tolerably steady, within the range of from 155,000 quarters to 475,000 quarters. Those from the southern ports have varied within the wide range of from 300,000 quarters to

1,200,000 quarters, until the last four years, when they were suddenly increased, amounting, in 1867, to nearly 3,000,000 quarters,—under the attraction of high prices.

AGRICULTURAL STATISTICS FOR THE UNITED KINGDOM.

	England, Wales, and the Isles in the British Seas.	Scotland.	Ireland.
Population in 1867	21,607,044	3,136,057	5,571,971
Total area	37,551,567	19,639,377	20,322,641
Total acreage under crops and grass	25,569,337	4,379,552	15,542,208
Corn, &c.	7,952,774	1,364,029	2,115,137
Turnips, &c.	2,851,502	668,042	1,432,252
Bare fallow	844,716	83,091	26,191
Flax	..	..	253,105
Clover and grasses under rotation	2,809,881	1,211,101	1,658,451
Permanent pasture	11,046,184	1,053,985	10,057,072
Waste	12,046,510	15,259,829	4,780,433

Total population	30,315,072
Total area	77,513,585

In Ireland the breadth under the potato has slightly decreased in the last ten years; it is still 1,000,000 acres, which supplies the reduced population with 4½ lbs. a day. In England and Scotland the supply is ½ lb. a day.

In McCulloch's 'Statistical Account of the British Empire,' 1846, he estimated the average yield of wheat per acre in England and Wales at 27½ bushels, after deducting seed. In his 'Commercial Dictionary,' 1853, these figures were reduced to 26 bushels. Arthur Young's estimate in 1770 was 23 bushels. Mr. Caird has stated that the clays of the Wealds of Surrey, Sussex, and Kent have been over-cropped with wheat, and yield less than they did in 1770. The same remark probably applies to a good deal of the unimproved clay land.

The population in Great Britain and Ireland, in 1821, was 21,300,000. Mr. McCulloch's estimate of the annual consumption was—

Number of Population.	Description of Corn.	Bushels per Head.	Quarters.
10,300,000	Wheat.	8	10,300,000
.. ..	Barley used in malt and spirits.	..	4,250,000
5,000,000	Oats.	16	10,000,000
2,000,000	Barley, rye, and pulse.	10	2,400,000
4,000,000	Potatoes.	..	..

A little less than half the population was maintained by wheat: now the proportion is more than two-thirds. There were nearly 7,000,000 in Ireland, of whom 4,000,000 were supported by the potato, and the other 3,000,000 consumed corn of various kinds to the amount of 2 quarters per head yearly.

At this period the country was suffering from the effects of the war. Prices were high, and taxes and burdens overwhelming. The diet of the people was inferior to what it was in 1765, when Mr. Charles Smith estimated that the total consumption of wheat amounted to 5 bushels per head for the whole population; and the barley used in malting and distilling to $4\frac{1}{2}$ bushels per head. In 1821 a duty of 28*s.* 10*d.* per quarter had reduced the consumption of malt, excluding spirits, to 3,000,000 quarters.

In 1853 Mr. McCulloch's estimate of annual consumption in the United Kingdom was—

Consumption per Annum.

	Quarters.	
Wheat	16,000,000	By Man.
Barley (including malt) ..	6,000,000	
Other corn and pulse	11,000,000	
Corn and pulse	16,000,000	By animals.
Total..	49,000,000	

Population 27,500,000.

The barley-eaters were 500,000, instead of the 1,500,000 in 1821.

To obtain the total production of the country, Mr. McCulloch deducts the amount of corn imported (7,000,000 quarters), and adds the very large quantity of one-sixth of the total produce (8,000,000 quarters) for seed. Total 50,000,000 quarters.

Since the repeal of the corn-laws the importations of wheat have increased in greater proportion to the increase in the population: they averaged 8,000,000 quarters a year for the past seven years against nearly four and a quarter million quarters for the seven years following the repeal. The average importations of all sorts of grain for the same periods have been respectively 14,192,000 quarters and 6,930,000 quarters in each year. An examination of our Tables shows the enormously increasing dependence of the country on importations, and that in respect to the growth of grain our agriculture is retrogressive; it supports a smaller number of persons than it did in 1831, when the population was 24,130,000. In 1831, the importations were almost nothing, and the whole population was supported on home-grown corn.

POPULATION of the United Kingdom, exclusive of the Army and Navy, from the period of the first Census.

1801.	1811.	1821.	1831.	1841.	1851.	1861.	1867.
15,795,287	18,006,580	20,983,092	24,132,296	26,833,496	27,533,755	29,070,932	30,270,000

AVERAGE yearly importations of Wheat and Flour (calculated as Wheat) and of other sorts of Corn for the ten years preceding each of the Censuses; and for the seven years ending and including 1867.

	Ten Years ending 1811 exclusive.	Ten Years exclusive of 1821.	Ten Years exclusive of 1831.	Ten Years exclusive of 1841.	Ten Years exclusive of 1851.	Ten Years exclusive of 1861.	Seven Years ending 1867.
Wheat and Flour ..	600,000	450,000	530,000	900,000	2,948,000	5,030,000	7,960,000
Other sorts of Corn	310,000	460,000	630,000	435,000	2,748,000	3,981,000	6,232,000

THE following Table shows the turning point in the history of our Agricultural Production.

	Increase of the Population since the last Census.	Increase in the Annual Importations of Wheat, in quarters, as compared with the last Ten Years.	Average Number of the Population maintained by foreign wheat, in each year, at 6 bushels per head.	Average Number of the Population maintained by the growth of the United Kingdom during the period.
1811	2,210,000	....	800,000	16,100,000
1821	2,980,000	A decrease.	600,000	18,890,000
1831	3,150,000	80,000	706,000	21,850,000
1841	2,700,000	370,000	1,200,000	24,280,000
1851	697,000	2,043,000	3,930,000	23,255,000
1861	1,540,000	2,082,000	6,706,000	21,600,000
1867	1,087,000	2,920,000	10,600,000	19,014,000

Inclosures to the extent of about three millions of acres in the first twenty years of this century, partly explain the increased production of that period. It must also be noted, in connexion with the diminished growth of wheat in recent times, that from 1820 to 1850, Ireland exported to this country an average of about 450,000 qrs. of wheat a year. Since 1851, Ireland has imported 1,125,000 qrs. of wheat a year, and the average for the past nine years has been 1,500,000 qrs. a year.

The native production of corn does not, actually, support the 19,000,000, since a considerable quantity of the extraordinary importation of maize was taken for human consumption in Ireland. Foreign barley is also used for malting. It will be remembered that large quantities of meat, live stock, and provisions are imported; and if the number of non-agricultural animals has increased since 1852, they are fed chiefly on foreign corn, and for all that the English farmer contributes towards their subsistence he is more than repaid by the quantity of foreign corn that is eaten by his own horses.

The revenue accruing from the enormous agricultural improvements which have been effected since 1821 is found in the improved subsistence of the whole of the population and in the meat, milk, wool, &c. produced for an additional ten millions, —with some deduction on account of foreign grain given to cattle.

The excessive dependence on foreign wheat tends to variation in price, because the uncertainty of foreign harvests prevents steadiness in the supply. Those questions, of vast social and political importance, connected with the food supply of this country will probably become subjects of pressing urgency and of practical discussion. The rapid increase of population here and on the Continent, and the competition of other nations, will force the country to the practice of a more self-supporting system of agriculture. Probably few persons recognise the extent to which agricultural production might be profitably increased by the application of a portion of the capital which at present seeks every possible way of outlet from this country, but never finds its way into our fields. The average amount per acre of capital employed in farming is lamentably deficient, notwithstanding the wealth of individual farmers and the aggregate wealth of the class. It would be easy to enlarge on the excellence of English agriculture; the following striking picture of its defects is from the pen of the late Professor Low, one of the most able and accurate of agricultural writers :—

"If we look at the finest parts of England, we might almost imagine that the purpose of agriculture was to raise hay for horses and not food for men. We find vast tracts of the finest land yielding wretched crops of hay, at an enormous expense of the manure which the country produces. But if the farmers, or rather the landlords, will take a lesson from the better cultivated parts of their own country, or from Flanders, they will learn that far larger crops of hay can be produced under a regular system of tillage skilfully pursued, than upon those large tracts of land kept continually in grass, and manured upon the surface. And not only for the production of hay, but for the production of the food of man, it is known that a far greater quantity of raw produce may be raised under a skilful system of agriculture, with a suitable succession of crops than under that system of perennial meadows, in which the greater part of the plains of England now is, yielding not one-half the

quantity of human food which they could be made to yield by suitable tillage. One of the causes of this state of things is the absence of proper tenures. A lease becomes of comparatively less value when land is kept constantly in grass. Such land requires little expenditure, which cannot be replaced within the year; and the security of long possession is not absolutely necessary to enable men to rear and fatten sheep and cattle. Hence it is that so much of the land of England remains uncultivated; and hence it is that, while the farmers of England are eminently successful in the branch of husbandry which relates to live-stock, they are eminently deficient in that which relates to the proper cultivation of the soil."

The reports of counties in this Journal amply confirm the truth of these remarks. Next to the poor pastures, the most unproductive lands are the heavy arable clays, which by the expenditure of capital in draining and deep tillage would become the most productive of corn and roots. The light lands of Hampshire, Norfolk, Cambridgeshire, &c., are chiefly in large holdings, and farmed by men of capital. The return on outlay on such soils is comparatively quick; the extent of farm-buildings is small compared to those required on heavy lands, because the root-crops are eaten on the land; the expenses of drainage and of deep tillage and costly cultivation are saved; the storage and heavy cartage of roots for winter-feeding, and the recartage of manure from the farmyards, are partly avoided; all incidental expenses are less than on heavy land; the saving in horse and manual labour is from 25 to 30 per cent. On light-land farms the tenant's capital lies comparatively at the surface; his land is cleaned, and his fallow-crops are grown (often with light manures only) at a small relative cost; the crop is eaten and the land manured at the same time by sheep, the most profitable of all stock. The succeeding crop of corn draws from the soil most of the goodness which it has just received, and the tenant's outlay returns to him quickly.

The heavy-land farmer must bury his capital deeper to get the same returns; as a rule he only skims the surface, hence the small average amount of capital employed in farming compared to the number of consumers.* Large imports ought to increase fertility, and lessen the cost of production just in proportion as the soil of the exporting country becomes poorer. The addition to fertility that would accrue from importations

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* In Fuller's 'Worthies' the proportions of heavy and light land are thus defined: "The sand hardly amounteth to a fifth part of England, therefore a drought never causeth a dearth.

> 'When the sand feeds the clay, England cries well-a-day!
> But when the clay feeds the sand, it is merry with England,'

because a wet year which drowneth and chilleth the clay, maketh the sandy land most fruitful with corn; but it is harder for one to feed four than for four to feed one."—H. E.

is lost by that waste of human excreta which constantly increases with the growth of the towns. Since 1821 ten millions have been added to the number of consumers. Whatever the actual waste may be, those who know the value of oilcake and beans in manure can form some conception of its enormous amount. No agricultural "improvements" can maintain the fertility of the soil under such a drain of plant food. Mere tillage—even by steam—does not create anything; practically, it destroys, if the fruits are thrown into the sea. Mr. Lawes's experiments in growing wheat-crops successively show the small yield of unmanured plots, and the exhaustion even of a strong wheat-soil. Ours is not a "virgin soil;" it is an old maxim that "it should be fed before it is hungry, and rested before it is weary." The present social system wastes, so far as reproduction is concerned, a large portion both of imported and of home-grown food. Against such waste, the manures and cattle-feeding "stuffs" are a very trifling set-off. Agriculture has to contend with a gigantic system of spoliation, and it must inevitably suffer from the diminished fertility of the land.

It has been stated that the purchase-money paid for foreign wheat returns in payment for our exported manufactures, and that by getting corn from abroad we gain a foreign customer. This is true; but we lose one at home and incur the cost of carriage, &c., amounting in some instances to 50 per cent. of the price of the corn. According to the principles of political economy, unnecessary labour is "profitless." It is in this light that agricultural hindrances and defects should be considered: they diminish the yield, while they increase the cost of production and our dependence on foreign growth.

NOTE.—Since our estimates were made, the elaborate paper by Messrs. Lawes and Gilbert, on the 'Home Produce, Imports, and Consumption of Wheat,' has appeared in the last number of this Journal: $5\frac{1}{2}$ bushels are there estimated to be the average yearly consumption, per head, of the population of the United Kingdom. Therefore, the average number of the population maintained by imported wheat, in each year, in the seven years ending 1867, will be 11,563,000; leaving 18,051,000 as the number maintained by home-grown corn, maize, &c. Messrs. Lawes and Gilbert believe that the average consumption of wheat, per head, has increased in the last sixteen years; but assuming it to remain at $5\frac{1}{2}$ bushels, then they calculate that the present total requirement for the United Kingdom of 21,175,000 qrs. will have increased by about 687,500 qrs. at the end of the next five years, on account of the addition of one million to the number of the population.

It must be remembered, however, that it is the wheat-eating population of England that increases; that of Ireland, which is estimated

to consume only $3\frac{1}{3}$ bushels, diminishes at the rate of about 47,000 a year; Scotland, which consumes $4\frac{1}{4}$ bushels, only increases about 100,000 in five years, and will not affect the calculation. These figures, applied to the estimated population of the United Kingdom at the end of five years, give a total of 22,370,749 qrs. Thus:—

	Population.		Bush.		Qrs.
England and Wales ..	23,320,000	×	$6\frac{1}{3}$	=	18,461,583
Scotland	3,280,000	×	$4\frac{1}{4}$	=	1,742,500
Ireland	5,200,000	×	$3\frac{1}{3}$	=	2,166,666
Total ..	31,800,000				22,370,749

The average annual consumption of wheat, per head, throughout the United Kingdom, has undoubtedly increased in the last 16 or 20 years; the Irish statistics alone will account for this. Messrs. Lawes and Gilbert think that this increase may, at the end of five years raise the average consumption from $5\frac{1}{2}$ to $5\frac{3}{4}$ bushels, giving a total of nearly 23 millions of quarters. They follow Mr. Caird in estimating the average production of wheat at $1\frac{1}{2}$ bushel per acre more than in 1850; and 27 bushels per acre for the United Kingdom. Assuming our fields to be well tilled, their fertility depends, as every agriculturist knows, on what we give compared with what we take from them: we shall not, in this country, soon become bankrupt in manure, but our expenditure in regard to human excreta is lamentable.

Whatever interest and value, for purposes of comparison, may attach to the foregoing figures, perhaps the most important consideration connected with our statistics is, that the progressive annual importations of wheat increase beyond all proportion to the increase of the population. In the last eight years they increased 3,000,000 qrs.; and in the two decades ending 1851 and 1861 they increased, respectively, 2,043,000 qrs. and 2,082,000 qrs. We commend these facts to those who are engaged in solving the problem of the utilisation of town sewage. Will these increasing supplies continue to reach us at the same average price? And what will be the result of the next cycle of unproductive years?—which, unless history omits to repeat herself, will some day overtake us, in spite of our " modern agriculture."

APPENDIX.

English Equivalents of Weights, Measures, and Moneys:—

German:—

1 last = 40 centals,	equal to	11 quarters.
1 cental	"	110·2 lbs.
5·3 scheffels	"	1 imperial quarter.
1 scheffel	"	1·512 bushel.
1 thaler	"	3 shillings.
1 morgan	"	0·63 acre.

Russian:—

$1\frac{1}{3}$ chetverts	"	1 imperial quarter.
1 "	"	5·77 bushels.
1 korzee	"	3·5 "
1 poud	"	36·4 pounds.
1 vlock	"	41·48 acres.
1 verst	"	1166 yards.
33 kopecks	"	1 shilling.
100 kopecks, or 1 rouble	"	3 shillings.

Table showing the Average Yearly Importations of Wheat in the Eleven Years ending 1867; and the Average Yearly Importations of Wheat in the Eleven Years ending 1856; and the Average Yearly Importations of Wheat from different Countries in the same periods:—

Countries.	Average Yearly Imports for the 11 Years ending 1867, inclusive.	Average Yearly Imports for the 11 Years ending 1856, inclusive.	Increase or Decrease.
	Quarters.	Quarters.	Quarters.
United States	1,824,000	1,053,000 +	771,000
Russia, Southern Ports	1,180,000	458,000 +	722,000
" Northern Ports	250,000	140,000 +	110,000
Prussia	1,070,000	597,000 +	473,000
France	912,000	430,000 +	482,000
Hanse Towns	288,000	197,000 +	91,000
Egypt	296,000	280,000 +	16,000
Other Countries	1,184,000	1,227,000 −	43,000
Total	7,004,000	4,382,000	2,622,000

QUANTITIES of WHEAT and FLOUR (reduced to quarters) IMPORTED

COUNTRIES.	1846. 54s. 8d.	1847. 69s. 9d.	1848. 50s. 6d.	1849. 44s. 3d.	1850. 40s. 3d.
	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
RUSSIA: Northern Ports ..	41,000	387,000	195,000	47,000	69,000
Southern Ports ..	164,000	463,000	327,000	546,000	569,000
PRUSSIA	361,000	493,000	528,000	617,000	836,000
HANSE TOWNS	34,000	82,000	361,000	329,000	222,000
FRANCE	74,000	179,000	320,000	739,000	1,145,000
EGYPT	8,000	124,000	17,000	128,000	247,000
UNITED STATES	808,000	1,834,000	296,000	613,000	537,000
OTHER COUNTRIES* ..	854,000	902,000	1,038,000	1,783,000	1,205,000
Total Quarters..	2,344,142	4,464,757	3,082,000	4,802,000	4,830,000

COUNTRIES.	1858. 44s. 2d.	1859. 43s. 9d.	1860. 53s. 3d.	1861. 55s. 4d.	1862. 55s. 5d.
	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
RUSSIA: Northern Ports ..	160,000	204,000	223,000	161,000	155,000
Southern Ports ..	452,000	681,000	1,082,000	885,000	1,172,000
PRUSSIA	629,000	772,000	1,151,000	1,029,000	1,451,000
HANSE TOWNS	203,000	152,000	252,000	294,000	230,030
FRANCE	1,283,000	1,867,000	1,052,000	314,000	452,000
EGYPT	465,000	377,000	198,000	340,000	726,000
UNITED STATES	1,099,000	99,000	2,143,000	3,602,000	5,022,000
OTHER COUNTRIES ..	1,052,000	799,000	1,233,000	1,993,000	2,304,000
Total Quarters..	5,343,469	4,951,871	7,334,164	8,618,000	11,548,000

* Denmark exported a general average of about 200,000 quarters of wheat

into the United Kingdom; and the Average Price.

1851. 38s. 6d.	1852. 40s. 9d.	1853. 53s. 3d.	1854. 72s. 5d.	1855. 74s. 8d.	1856. 69s. 2d.	1857. 56s. 4d.
Quarters.	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
35,000	27,000	252,000	21,000	001	474,000	298,000
664,000	706,000	819,000	486,000	5	292,000	409,000
696,000	452,000	1,146,000	675,000	540,000	223,000	870,000
101,000	49,000	224,000	340,000	254,000	174,000	271,000
1,193,000	459,000	341,000	206,000	51,000	30,000	131,000
533,000	395,000	358,000	303,000	437,000	535,000	204,000
912,000	1,232,000	1,582,000	1,152,000	445,000	2,103,000	1,069,000
1,206,000	844,000	1,514,000	1,290,000	1,485,000	1,376,000	808,000
5,330,000	4,164,000	6,236,000	4,473,000	3,212,000	5,207,000	4,060,000

1863. 44s. 9d.	1864. 40s. 2d.	1865. 41s. 10d.	1866. 49s. 11d.	1867. 64s. 5d.	1868. 63s. 9d.
Quarters.	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
155,000	310,000	195,000	404,000	378,000	2,320,000
891,000	880,000	1,672,000	1,714,000	2,924,000	
1,020,000	1,148,000	1,266,000	1,032,000	1,305,000	1,058,000
680,000	209,000	183,000	303,000	279,000	350,000
428,000	658,000	1,398,000	1,851,000	495,000	193,000
536,000	84,000	2,000	7,000	336,000	743,000
2,739,000	2,325,000	945,000	227,000	959,000	1,556,000
679,000	1,041,000	302,000	1,240,000	1,358,000	2,194,000
7,128,000	6,655,000	5,963,000	6,778,000	9,031,000	8,414,000

from 1846 to 1860; Germany, 150,000 quarters; and Canada, 150,000.

The following sketches and statistics, condensed from Consular Reports, will not, it is hoped, be thought too voluminous by those who are specially interested in the resources of foreign agriculture.

Agriculture of Poland.

WARSAW, *May 9th*, 1862. (From Colonel Stanton's Consular Report.) —The navigation of the Polish rivers is sometimes so bad that corn does not get to Dantzig until two or three months later than usual, at increased cost. In 1862 little corn was moved on account of the low state of the rivers from drought. The rivers Bug, Narew, and Vistula, are closed by ice from October till April. The bed of the Vistula is liable to be blocked by sand banks, shifting during the winter floods and stopping navigation at low water. Steamers ascend to Vangrod; there is no traffic above Warsaw except for rafts, which descend the stream. One-third of the wheat exported from Dantzig comes from Prussian Poland, two-thirds from Russian territory. It is brought in flat-bottomed boats, holding 200 quarters, made with a fir-tree for a keel, with hurdles and mats to keep the corn from the leaky sides. These vessels are knocked up and sold at Dantzig. The cost of river-carriage is 4*s.* to 10*s.* per quarter, according to distance, in ordinary times; but greater when there is an unusual demand.

In bad seasons there is hardly enough corn to feed the population. In good seasons the exports of wheat to Dantzig are from 200,000 to 400,000 quarters.

Although considerable progress in the system of farming has been made during late years, and modern improvements in farm implements have been introduced by means of the large landed proprietors, the state of agriculture generally throughout the kingdom of Poland is lamentably backward. With reference to Western Europe, and in bad seasons, the produce of the soil is barely sufficient to meet the demands of the population, which only averages 127 persons to the square geographical mile.

The great difficulty in the way of introducing, generally throughout the country an improved system of agriculture, is to be found in the large number of peasants holding land, and the obstinacy with which this totally uneducated class clings to the system handed down to them, and refuses to adopt any changes in that system, which, having been approved of by their forefathers, must, in their opinion, be superior to any other that can be proposed, and so strong is their feeling that even the actual evidence of the advantages gained by those who have abandoned the old routine, has not hitherto been sufficient to induce them to abandon their old-fashioned notions.

This old system which still prevails to so great an extent, and which has been described by Mr. Jacobs, leaves one-third of the land fallow every year, the remaining two-thirds being sown in the autumn with wheat, on such portions as can be manured, and the remainder with rye, these being followed with crops of oats, barley, peas, &c.

In the parts of the country where this old-fashioned system has been modified, potatoes, beet, and other roots, have been grown on the portions formerly allotted to fallow, and various rotations of crops with a different system of cultivation and of manuring, and with the introduction of artificial grasses, have been followed out, much to the benefit of the produce of the country.

The kingdom, which contains about 31,500,000 English acres, may be divided as follows, viz.:—

	Acres.
Arable land	15,000,000
Forest	12,500,000
Meadow and common pasture	3,000,000
Roads, rivers, &c.	1,000,000
	31,500,000

Of the arable land, only one-ninth can be considered as good soil, and favourable for the cultivation of wheat.

A few years since one of the leading agriculturists of the country made a calculation of the manner in which the whole of the arable land in the country, whether occupied by the gentry or peasants, and whether the property of the Crown or private individuals, was distributed for crops, with the following results, viz.:—

	Acres.
Land sown in autumn with wheat	840,000
,, ,, ,, rye	4,160,000
Land sown in spring with barley	1,250,000
,, ,, ,, oats	3,350,000
,, ,, ,, peas	400,000
Land planted with potatoes	700,000
,, ,, beet-root	40,000
,, ,, green crops	80,000
Fallow	4,180,000
	15,000,000

The annual value of these crops is stated by the same agriculturist as being, on an average, after the deduction of seed, about 9,150,000*l.*, giving the value of the produce per acre about 17*s.* English.

The total average produce of the kingdom is given by this author at about 11,000,000 quarters of grain of all kinds, and 9,000,000 quarters of potatoes; but as this return gives the produce of grain at little more than one quarter to the acre, I do not imagine that much faith can be placed in the figures. Unfortunately no agricultural statistics of any kind are published in the country as yet; but, according to the official return of 1860, the gross total of the grain crop for the year amounted only to 11,410,000 quarters, which agrees with the above-quoted figures, but no details are specified from which to check the amount.

May 9th, 1862.—From private sources, I have gathered that the average production of wheat per English acre is calculated at 14 bushels, which agrees nearly with the return given, and would give the average amount of wheat produced in the country at 1,470,000 quarters annually.

As the result of inquiries from competent persons, as to the improvement introduced in the system of agriculture, I may mention that about one-half of the landed proprietors have introduced a systematic rotation of crops, the use of machinery for diminishing manual labour in farming operations, and the cultivation of clover and other green crops; whilst the stimulus given to these improvements by the late Agricultural Society, as well as to the amelioration of the breed of cattle, has had a most beneficial effect. But the peasants, even those who hold their land on perpetual leases, have not as yet perceived the advantage of the improved system. The use of artificial manures and drainage are still little understood in the country, and from the want of capital must remain out of the reach of many.

The small proportion of live stock, and consequently the quantity of manure available, is totally out of proportion to the requirements of the soil, and the farmers are thus forced, by the want of this necessary item, to limit themselves

to the cultivation of rye, where, under a better system of farming, the production of wheat might be both possible and profitable.

The length and severity of the winter, and the coldness and frequent dryness of the spring, are serious drawbacks to the operations of the farmer, who will now also have to contend with a new difficulty caused by the abolition of the corvée (forced labour), viz., the increased difficulty of procuring labour for farm services.

An idea of this may be gathered from the following summary of the amount and distribution of land hitherto held by the peasants, under the corvée system of tenure, on private estates:—

The total area of land so held may be stated to have been about 2,558,000 English acres.

These 2,558,000 acres are distributed in 124,840 different lots.

The population of these holdings amounts to about 750,000 souls, and it may be supposed that the cultivation of these lots will occupy the greater portion of the time and labour of the holder, and thus prevent them hiring themselves out as farm servants.

The Agricultural Society of the Kingdom, during its existence, endeavoured to instil into the minds of the lower orders the advantages to be obtained by them from an improved system of farming by the circulation of useful information in a popular form; and that the wants of the country were understood by its leading members may be gathered from the following extract from the report of one of them:—

"The backward state of our agriculture is to be attributed chiefly to the want of a proper proportion between the production of grain and that of pasture, and is caused by our neglect of proper breeding and feeding of live stock; that foundation of good farming. I do not consider that the introduction of a system of a succession of crops is of itself sufficient to enable us to resume our place as a productive country; the mere subdivision of the cultivated soil when it is exhausted (however rational), cannot obtain that object unless it is accompanied by other improvements, and especially by much more attention being given to the meadows, and a considerable increase being made in the proportion of animal food."

The export returns of the kingdom for the year 1860 show that rather less than a million quarters of grain were exported during the year; and taking the figures previously quoted, and a return by the same authority of the quantities of grain required for the home consumption as a basis, it would appear that the amount for exportation in the country could not have exceeded in any important quantity the amount actually exported.

		Quarters.	Quarters.
The total grain crop being estimated at			11,400,000
If we deduct required for seed		2,400,000	
,,	for home consumption at one quarter per head	4,800,000	
,,	food for live stock	3,000,000	
,,	used in distilleries	200,000	
Total		10,400,000	10,400,000
Surplus			1,000,000

We have, as a surplus of the year, one million quarters of grain of all descriptions.

There can be little doubt that the production of grain may be very considerably increased by the introduction of an improved system of farming; but it is doubtful whether any very large increase to the export can be obtained,

as the advance of civilization among the peasants would probably at the same time increase their wants, and the increase in the consumption of animal food that might be expected would necessitate a large increase in the consumption of grain as food for the cattle during the winter months.

The average price of wheat in Poland during the year was 42*s.* per quarter, taking the average rate of exchange for the year; the price of rye during the same period averaging 24*s.*

A very considerable advance has taken place of late years in the value of grain, and stock of all kinds, as may be seen by the following comparison of the present market value with former averages:—

Price of Grain per Quarter.

	Present Rate.	Average for 30 Years.	Price in 1854-5.
Wheat	42*s.* 0*d.*	18*s.* 0*d.*	52*s.* 0*d.*
Barley	22 0	8 0	24 0
Rye	24 0	12 0	36 0
Oats	16 0	6 0	20 0
Peas	26 0	12 0	36 0
Buckwheat	22 0	8 0	24 0

The price of potatoes is about 1*s.* per bushel.

Price of Animals per Head.

	In 1861.	In 1833.
A farm horse	11*l.* 8*s.* 0*d.*	5*l.* 0*s.* 0*d.*
An ox	8 0 0	3 16 0
A peasant's cow	5 4 0	2 8 0
A pig	4 16 0	2 0 0
A sheep	0 16 0	0 8 0

The return of live stock in the kingdom, for 1861, gives the following details of the numbers:—

Horses		590,873
Horned cattle	Oxen	558,384
	Cows	1,251,993
	Calves	527,511
Sheep		3,722,676
Pigs		927,511

which gives the following proportion of the live stock to the acreage of the kingdom, viz:—

1 horse to 53 acres.
1 head of horned cattle to 13½ acres.
1 sheep to 8½ acres.
1 pig to 34 acres.

There can be no doubt that this proportion of live stock is far too small for an agricultural country; and though it has been steadily on the increase for some years, many causes impede progress, the chief being the periodical visit of the cattle epidemic, "Peste Bovine," so destructive in its character. Another serious impediment to the progress so much to be desired is to be found in the very slight inducement offered to breeders by the small consumption of, and consequently demand for, animal food throughout the country.

It is worthy of remark that all the cattle in the kingdom is insured against the cattle epidemic, and that stringent measures are adopted by the Government to prevent this terrible scourge from spreading should it unfortunately pass the frontier. In fact, wherever this disease makes its appearance within the kingdom, the whole of the cattle in the immediate

vicinity are destroyed forthwith, the Government paying a remuneration at the following rates, viz.:—

For an ox or bull	5*l.* 5*s.* 0*d.*
For a cow	3 15 0
For a heifer	2 5 0

The total value of the cattle insured amounted, in the year 1861, to 8,813,389*l.* 10*s.*; whilst, in the year 1857, it amounted to 7,602,129; this increase being chiefly due to the non-appearance of the epidemic since the year 1857, probably owing to the precautions taken to prevent its reaching the frontier of the kingdom.

Population and Industries.—The population of the kingdom of Poland at the latest census amounted to 4,840,466 persons.

Poland is so essentially an agricultural country that little extension is given to manufactures, or industries in general; the extraction of sugar from beet-root is, however, an exception to this rule.

Report by Consul Stanton for 1862-3.

The improvements that had been introduced into the system of cultivation pursued in Poland during late years were completely brought to a standstill by the late insurrection; the insecurity of life and property in the country districts, and the heavy losses of farming stock, particularly of horses, to which the owners of land have been subjected, rendering any continuation of these ameliorations quite out of the question during the past year.

The late Imperial ukases published in the month of March of this year, which make a complete social revolution in the country, and constitute the peasants the actual possessors of the lands they had previously held on leases, and the numerous unsettled questions connected with the various rights, or claims, these peasants may have on the lands still remaining to the former proprietors, have naturally tended to depreciate (at least temporarily) the value of real property throughout the kingdom, and have created a state of uneasiness and uncertainty in the relations of the two classes to each other, the results of which can hardly as yet be calculated. It may, however, be supposed that the agricultural prospects of the kingdom are not likely to be improved by the fact of so large a portion of the soil passing into the hands of a totally uneducated class, without the necessary qualifications for good farming, viz., capital and energy.

In the past year the principal cattle epidemic has committed great ravages, in consequence of the impossibility of maintaining, during the insurrection, the necessary precautions against the spread of this scourge.

POLAND. REPORT BY MR. CONSUL MANSFIELD FOR 1865.—The great social reforms which have been initiated during the last two years have caused great embarrassment, but will ultimately be of the greatest service to the country.

The navigation of the Polish waters opened the 15th of April and closed the last days of November.

Exports by Water.—Wheat 430,000 quarters; rye, 240,000 quarters. Other corn and pulse trifling.

Average depth of the Vistula, 3 feet 9 inches; the greatest depth having been 13 feet 4 inches in April, and the least, 1 foot 4 inches in October.

The bad quality of last harvest, and the absence of forced labour, were most disastrous to the farming interest; and as a large section of the population depend entirely upon the cultivation of the soil, a great and general distress prevailed. The agricultural class are now pretty well alive to the fact that the old *régime* is at an end, and that henceforth they must depend on their own

energy and call in the aid of science to make up the deficiency of labour. Much attention is being given to manuring and draining, and even to pasture land an attention is being paid which was before unknown, and the farmers are now convinced that it will pay best to get heavier crops from a smaller area of land. Much greater progress would be made were there not such a total want of capital in the country; and the bad feeling of the peasants to the better class is another source of loss and difficulty. The arrangements connected with the peasant question are a cause of the greatest loss and inconvenience to the land-owners of the kingdom of Poland, more especially to the proprietors of the larger estates.

1866.—Crops abundant; corn in many instances sold standing, as neither proprietors nor peasants had money to live upon, or to pay for harvesting. Vast tracts must go out of cultivation for want of capital.

The cultivation of beet root and manufacture of sugar has become a profitable speculation, and also helps to withdraw capital from pure agricultural business.

Return of Grain Crop for 1864.

Wheat	1,440,000	quarters.
Rye	4,750,000	,,
Barley	1,560,000	,,
Oats	3,100,000	,,
Potatoes	6,500,000	,,

Average price of wheat in Warsaw market in 1865, 9 roubles (1 rouble = 3*s.*) 57 kopecs ($2\frac{3}{4} = 1d.$) per chetvert (5·77 bushels).

A day labourer per diem, 50 kopecs; a one-horse cart, 2 roubles 25 kopecs per diem. Population (which is found to be greater than it had been reported under the old system of return), 5,155,563, besides 235,811 in the town of Warsaw.

Till the year 1819 the communication of the kingdom of Poland consisted merely of country roads and of rivers. From 1819 the most important roads began to be Macadamized and the more important rivers to be cleared from obstacles, and in 1825 the construction of the canal Augustov commenced. From 1842 the country roads began to be converted into high-roads of the second-class; and finally, in 1848, the Warsaw and Vienna Railway opened.

Agriculture of South Russia.

ODESSA, *February*, 1863. From Mr. Consul-General Murray's Commercial Report for 1862.—An opinion has been propagated in Russia and elsewhere that the corn trade at Odessa would be put to a disadvantage by recent railroads in Austria and Hungary, but railroads will not compete with the rivers of South Russia in ordinary times and prices.

Harvest, in 1862, bad in Kherson and near Odessa; good in Podolia and Bessarabia (and good in England and France); very little corn by the Dnieper that autumn. In September and October, 1862, fine Polish wheat sold, at Odessa, at 33*s.* to 34*s.* 6*d.* per quarter, while Hungarian, at Triest, cost 40*s.* per quarter.

Inferior wheat, at Odessa, 23*s.* to 25*s.* Speculators expect to deliver wheat at Odessa, from Podolia and Bessarabia, at 31*s.* per quarter, in *May* 1863. When the Russian Government has spent 300,000*l.* in rendering the Dneister navigable for iron barges from Khotin to the mouth of the river, 2,000,000 quarters of *grain* may be brought to Odessa, from Podolia and Bessarabia, at a cost of 2*s.* to 2*s.* 6*d.* for transport—and Odessa may then compete with the world. America has been her most dangerous rival, owing to the canal and river navigation of that country, which is so much cheaper than railway carriage.

The emancipation of the serfs has been a temporary cause of interruption of the corn trade. Also the reduction of profit on exportation of grain, which used to reach 15*s.* a quarter, the wealthy merchants having the monopoly of information (in the absence of the telegraph), which enabled them to dictate their own terms to producers.

The export trade suffered from the fall in prices in spring, 1862, after large imports in the preceding year, and this is likely to be the case in the year following a period of great demand in England and France.

The transit by the Dneister to Odessa from the districts which export most corn is 300 miles; that by river and rail to Triest from Hungary is 800 miles. The produce of the latter will be chiefly consumed by Austria, Silesia, and Saxony, except in dear times.

1,000,000*l.* is about to be spent in the improvement of Odessa; a contract for clearing the port is negotiating; and 8,000,000*l.* of British capital are about to be invested in a railway to Kieff.

Capital is being expended in machinery, &c., by the landowners.

ODESSA. Report by Mr. Consul-General Murray for 1863.—During the early part of the year the corn trade at Odessa was very dull, but it improved towards the close of the autumn. It is probable that on completion of the railway to Kishinieff, now in progress, the trade in grain here will not only become larger than ever, but that Southern Russia will be able to supply corn to England at prices which will defy all competition from other countries.

The number of sailing ships under British flags continues to diminish, as merchants can charter Greek and Italian vessels much cheaper. The number of steamers also augments, and their tonnage is larger than formerly.

The arrangements so long pending between the land owners and peasantry have generally been satisfactorily settled in this part of the country. The price of land, however, has fallen considerably, and there are a great many fine estates in the market without buyers.

Agricultural machinery continues to be largely imported from England.

The most remarkable feature for the past year has been the numerous British railway and other companies tendering for contracts in Russia, and the steady increase of the trade and relations between Russia and Great Britain, as well as the increase of good feeling generally observable on the part of the Russians towards the English established here.

In conclusion, the prospects of Odessa look brighter than they have done for some years past. Owing to the railways already commenced, and the new University, this city is likely to rise rapidly in size, importance, and commercial prosperity. It must remain for many years to come the principal port of export for the rich produce of Poland and Southern Russia, as well as the chief port of import for railway plant and agricultural steam machinery.

1864.—The scarcity of agricultural labourers to cultivate the immense tracts of rich corn lands which remain fallow year after year, from the want of means to bring them under cultivation, has at last attracted the serious attention of landed proprietors, and they are beginning to try to remedy the evils of a scanty population by the introduction of steam machinery in the cultivation of land. As, however, this method of farming is quite new, many and very serious difficulties are met with. Machines will break when far away from a workshop. The peasants have to learn the way to use modern agricultural implements. Proprietors generally cannot at first imagine that an engineer to work their machinery is indispensable, and they try to work it themselves, and only become convinced of their inability, and the necessity of having competent workmen, when they see boilers burst and engines blown to pieces. All these difficulties, however, will soon disappear, and there can be no doubt

that shortly British machinery and implements will be widely employed, in this portion at least of the Russian empire, to the great benefit of the country.

A very serious obstacle to the development of this country exists in the want of means of communication. Not a single road has been constructed throughout the South of Russia. Produce is dragged in clumsy carts to the sea-ports over plains which are difficult to traverse from the dust into which the soil of this country changes during the hot weather, or from the mud in wet seasons, which in many places puts a stop to all communication. It thus happens that to transport grain over a few miles to the shipping ports generally costs more per quarter than the freight to England. Indeed, the cost of transport altogether is about double the price paid for corn to the farmer.

A railway running from Odessa to some of the grain-producing districts in its neighbourhood was projected two years since, and its contractors confidently assert that it will be completed by next winter. If their anticipations prove correct it will be of great benefit to the country, especially if it is followed up by branch lines opening up the corn-growing districts generally. Grain will then, it is believed, be shipped at less than one quarter its present cost, and Odessa will become one of the chief granaries of Europe.

The Russian Government seem, till very lately, hardly to have been aware of the value of Odessa as a sea-port. The works of public utility, which would soon render her one of the great cities of Europe, have been neglected, though their cost, when compared with the results, would be insignificant. These important undertakings have at length been pointed out, their usefulness and their advantages have been demonstrated to the Government, and their projectors have succeeded in awakening those in power.

ODESSA. Report by Mr. Consul-General Grenville Murray, 1865. —Crops of 1865 generally bad and poor. Grain is the chief produce of the country. Three-quarters of the land continues to be waste, owing to the scarcity of hands to cultivate it, the want of money to purchase machinery, and the intelligence to manage it properly. Vegetable produce of all kinds is scarce, owing to the dry nature of the soil.

The quantities of wheat exported from Odessa to all parts of the world were, in—

	Quarters.	
1847	2,016,000	crop abundant; prices high in the west.*
1851	719,000	
1852	1,360,000	of which, 570,000 to the United Kingdom.
1863	1,147,500	
1864	1,595,300	
1865		

TAGANROG. Report by Mr. Consul Carruthers, 1861.—The country is scantily peopled. With water communication (which might be easily obtained), and practicable roads, this port would command the most fertile provinces of the empire, and but for the cost of transport the accumulation of grain might be ample, if not inexhaustible.

These provinces might soon outstrip the Northern ports in commerce and wealth. There will probably be one-third less land sown next season than usual, owing to the transition from serfdom to free labour, and the perturbed state of agriculturists.

* This large exportation, with that from Taganrog, was distributed chiefly among the Mediterranean ports. Marseilles was the principal customer. England took 463,000 quarters in 1847 from the southern ports of Russia.

Locusts have lately established themselves in these localities, and are likely to be very destructive.

Crop of linseed deficient, sellers not willing to take 42*s.* 6*d.* per quarter free on board.

Harvest of 1860 deficient. An anticipated demand for United Kingdom kept prices, till June, at 43*s.* to 45*s.* per quarter for hard, and 40*s.* to 43*s.* for soft, or Ghirka wheat, free on board; and then came a decline of 3*s.* or 4*s.* per quarter, and the ruin of merchants would have followed, but in July a deficient crop in France found them a market.

Stock of wheat here and at Bostoff about 200,000 quarters.

Purchases of 250,000 quarters, made inland for delivery next summer, calculated to cost 35*s.* free on board.

1862.—Trade in exports stopped by ice in the Azoff at the end of November. Autumnal easterly gales common. The port unprotected for shipping. Crops for 1861 abundant, but injured by rain. Export of wheat in 1862 over a million quarters. Prices for soft wheat during the year, 30*s.* to 36*s.*; and for hard wheat, 34*s.* to 40*s.* per quarter, free on board. "Prices are now (January 20th, 1863) maintained above the proportionate level of foreign markets, and there is likely to be a considerable falling off in next season's exportation, owing to the deficient harvest of 1862." Stocks at all the Azoff ports not over 300,000 quarters. "The main difficulty which agriculture will have to contend with will be the droughts to which this country is subject."

Hard wheat is grown on the virgin land, and on that which has laid in fallow for several years; it is sown in spring, and is liable to injury from moisture at harvest.

Turkey and the Archipelago are the best customers for second qualities.

January 20th, 1863.—Freights of wheat in spring, 1862, 9*s.* to 10*s.* per quarter to England, falling to 7*s.* by autumn. The export trade exhibits no elasticity, and no extension can be expected except with greater freedom from tariffs and forms. Soil fertile in South Russia, but under the present dislocated social state no improvement in agriculture can be expected, and the droughts will always be an evil.

Linseed less in favour, from its exhausting the land. Some steam-power implements on wealthy estates, but they require skill and costly fuel, and repairs are not easily effected.

Prices now maintained at 33*s.* to 37*s.* for soft, and 35*s.* to 42*s.* for hard wheat.

Crop of 1862 bad, and the exports for 1863 will be small.

Report by Mr. Consul Carruthers for 1863.—The substitution of free for serf labour in Russia, when in full action, will call forth the energies of the labouring classes, and oblige the landowners to resort to an improved method of cultivation; but as the population of Southern Russia is small and scattered, it is improbable that the employment of manure, or other appliances for the speedy recovery of an exhausted soil, will be soon brought into practice. The necessity of providing mechanical power for the large estates is, however, fully acknowledged, and thrashing-machines, driven by steam, have become of common use in the vicinity. A variety of implements have likewise been introduced for carrying out more speedily, and with better effect, the ordinary works of husbandry.

January, 1864.—Since 1857, Azoff has not been able to compete with other corn-growing countries, and losses of 5*s.* to 10*s.* per quarter have often been made on shipments. Large supplies from America in 1862 paralysed the market, and though these were more moderate last year they were sufficient (with the prospective crop of 1863) to cause a collapse of prices in all countries. Inland purchases of soft wheat were made last winter (1862-3) on the basis of 45*s.* per quarter delivered in England, and prices at Taganrog were maintained

at that level during the summer (1863). But British markets declined to 40*s.* in summer 1863, and even dropped as low as 34*s.* in autumn. Nevertheless, Russian holders, who could have sold better at home, consigned to England and elsewhere in expectation of a rally. On the approach of winter, prices at Taganrog fell to an equivalent of 37*s.* to 38*s.* per quarter delivered in England.

Report by Mr. Consul-General Grenville Murray, *February 5th*, 1865.—Improvements in the navigation of the Don would (from the position of Taganrog and the command of fertile territory) make the grain export trade of the Azoff the most important in the world. Other cereals besides wheat are gaining ground, and by the improvements coming into practice and the introduction of implements, cultivation will be rapidly extended. The exports of *wheat* from Taganrog, for the five years ending 1863, averaged 1,000,000 quarters, with very little variation in the quantity each year.

Mr. Carruthers's Report, *January*, 1865.—Stocks in spring light at all the Azoff ports. Trade active in spring, arising from the prospective buoyancy of foreign markets and the low freights. As soon as the roads were passable supplies began to flow in.

Vegetation checked by cold weather and night frosts up to May; grass crops entirely failed; corn revived by more genial weather, which was followed, however, by a drought and general failure of the harvest (1864).

This, with the fall of the waters of the Don and its tributaries, which arrested the progress of 170 barques laden with grain (got off at a great loss and cost), caused a temporary rise in price of 3*s.* to 5*s.* a quarter. The promising aspect of the approaching harvest in the West of Europe checked the rise; but the failure of the crops in the Soratoff Government, and on both littorals of the Azoff, and in many of the northern districts, prevented a decline of prices to the proportionate level of rates ruling in the Mediterranean ports and in England. There is, however, abundance of corn in the inland districts of Veronege, the Ukraine, and a portion of Ekaterinosloft, and should prices be sufficiently high to cover the cost of distant conveyance, the exportation of 1865 may equal that of 1864.

The recent changes in the social state of Russia, together with several indifferent harvests, have not been favourable to the development of agricultural improvements. The landed proprietors as a body are too much impoverished to undertake alterations necessitating considerable expenditure; nor have the farmers latterly obtained sufficient returns to enable them to incur an outlay of capital for the sake of distant advantage; the peasantry, likewise, still under the influence of their late thraldom, are scarcely yet conscious that they must rely solely on their own industry and providence to better their condition. There is, nevertheless, a growing conviction that time is really of value; that if land be brought under improved cultivation, a gain in quality—probably in the quantity of produce also—may confidently be expected; and that if work can be accomplished in one week which occupied hitherto double that space of time, a palpable advantage is obtained. Agricultural machinery and implements are consequently beginning to be appreciated; but before a marked and general improvement in the cultivation of the soil in these regions, the present generation must have passed away, and a more enlightened and vigorous spirit have taken root.

TAGANROG.—Report by Mr. Carruthers for 1866.—Crops of 1865 harvested in bad condition, through rains. Demand for foreign markets inactive, with no disposition to speculate. Production of cereals, in 1866, irregular. The environs of Taganrog, Rostoff, Bachmont, those of Veronege, the line of the Caucasus, and Tchernamore districts, were highly favoured; whilst the vicinities of Mariapol, Starabelsk, Bialavodsk, and the Government

of Saratoff, remained comparatively unproductive. Grain harvest, on the whole, an average, of fair quality, and secured in good condition.

Vast tracts of untilled land now lying waste in these regions. A thin, scattered population cannot advance rapidly in cultivation; for although the immigration of labourers from the northern Governments is annually considerable, they find employment merely during the summer months, and return home for the winter. Steam thrashing-machines and improved implements have become a powerful auxiliary to manual labour; but these, again, are costly, and worked at too heavy a charge for any but the larger proprietors. Fuel can only be obtained with difficulty in the rural districts; mechanicians must be engaged to keep the machinery in order. In Southern Russia, where skilled labour is highly paid, a considerable permanent charge has to be provided for, in addition to the first heavy outlay, by those who have recourse to the more advanced system of agricultural appliances. Roads, railways, and improved fluvial communications, are the main desiderata. The former are altogether neglected. Of railways, there is endless discussion, numerous projects, and nothing determined, the Government being far more intent on strategical combinations for military purposes than on the advancement of commerce. In regard to improvement of the river communications, the remedies for existing evils have been very partially acted on. The works in progress for removing the shoals at the mouths of the Don are conducted with some assiduity by a committee of merchants.

Although little effort is apparent on the part of the Crown in this quarter to facilitate intercourse and promote commercial relations, railways from the northward are gradually working their way in this direction. A line connecting Moscow with Riazan was opened a couple of years since, and completed as far as Kozloff, in the governmental district of Tamboo. The landed interest of those vicinities, being alive to the advantages that would accrue by continuing the same line to Voronege, have themselves undertaken (with the Imperial sanction) to raise the necessary funds for that object, and operations have already commenced. Both the above-named provinces, more especially the latter, have heretofore furnished liberally Rostoff and Taganrog with supplies of wheat and linseed. Arrangements are now, however, being made to have such produce conveyed northward by rail, and there is little doubt but a considerable portion of the growth of those localities will henceforward find its way to St. Petersburg. The cost of steam transport so great a distance must necessarily be very heavy; if, however, the expenses thence to the United Kingdom be compared with those incurred from this port, say a diminution of two-thirds freight, with a corresponding economy for insurance, besides the sea voyage usually accomplished from Cronstadt in three weeks, instead of three months, as from Taganrog, the more expensive but speedier route, may, in the result, prove the most suitable for mercantile combinations. Such an encroachment on the existing resources of this trade will doubtless be counterbalanced to some extent by the increase of production that may be annually reckoned on from the fertile plains of the Caucasian line, the Tchernamore and the Cuban, where colonisation is being urged forward by the Russian Government, and whence very considerable quantities of grain, lead, and wool, are already furnished.

Report by Mr. Consul H. Carruthers on the Trade and Commerce of Taganrog for the Year 1867.—The exportation of wheat at this port last year exceeded that of any previous season on record, and that of rye was more than threefold in excess of the largest perennial shipments. This article has now assumed a prominent position among items of the export trade; but with the sole exception of cereals, exports here have languished, and exhibit little variation on the average of preceding years.

An article, the cultivation of which has hitherto been neglected in this

quarter, showed itself at a neighbouring port last season, in the shipment from Yeisk of a couple of cargoes of Indian corn. This pulse appears to be well suited to the soil and climate, and may be looked forward to as a valuable addition to the commercial resources of the country.

It may not be superfluous to mention here that the Tchernamore province and country, on the line of the Caucasus, so highly favoured with agricultural produce in 1866, were much less fortunate last year; and those localities will be unable to afford any considerable addition to the other resources of this trade up to next harvest.

In the earlier half of last season, business in exports having been of a forced character, was but slightly remunerative to foreign merchants. Owing, however, to the advance of prices abroad, during the last six months, a profitable business was carried on, more especially in the autumn, although scarcity of shipping, with high rates of freight and insurance, towards the close of the navigation, tended much to curtail the benefit of those operations.

The course of these markets, and estimation in which the various export articles were held throughout the past shipping season, will be exposed more in detail under their respective headings, viz.:—

Wheat.—Hard was in good demand during the early part of last year, and fine qualities, which were scarce, eagerly sought after. Purchases of this description opened in January at the excessively high rate of fully 53*s.* per quarter on board. It was assumed at the time that no advance could take place thereon under any circumstances, but before the close of the month 58*s.* per quarter had been given; and the same free-on-board cost was submitted to in February and March. A decline of about 2*s.* per quarter became observable in April, and by July prices had fallen back to about 50*s.* per quarter on board, under which superior qualities were not procurable up to the closure of the navigation, although an abundant harvest had in the interim come forward. Inferior descriptions of hard wheat ranged from 42*s.* to 46*s.* per quarter on board until the end of May, when a drop of from 2*s.* to 3*s.* per quarter took place. The free-on-board cost, from June to the termination of the season, was from 38*s.* to 42*s.* per quarter.

Yhirka, or soft wheat, was firmly held and but little obtainable at the re-opening of the navigation last season, when from 39*s.* to 42*s.* 6*d.* per quarter were paid free-on-board. The superior kinds, shipped principally to France, realised at the same time 44*s.* 6*d.* to 49*s.* per quarter, free-on-board. Prices did not give way until the middle of June, when the bulk of the inland supplies had come forward. In July, 38*s.* were quoted for inferior, and 45*s.* per quarter, free-on-board, for the better qualities, since which prices continued to creep up until the closure of this port by frost. At present, free-on-board quotations stand as follows:—

	£	*s.*	*d.*	
Hard wheat, best	2	12	4	per quarter.
,, ordinary	2	6	3	,,
Soft wheat, best	2	10	10	,,
,, ordinary	2	7	0	,,

Stocks of wheat at this place, Rostoff inclusive, are estimated at 150,000 quarters, at all the other Azoff ports 170,000 quarters, which quantity cannot be extensively increased before the summer months, most of the supplies in contiguous localities having been, as above mentioned, already brought forward for sale.

Much has been conjectured and said of the effect which the projected railways, when completed, will have on the Russian corn trade, the diminution likely to take place in the cost of transport, and the comparatively low prices whereat British markets can then be supplied with cereals. It has been stated

even that Russian wheat might be delivered in England at 30*s*. per quarter. Those who venture to hazard such an opinion can know little of the subject on which they treat, still less of the obstacles to free intercourse and lack of resources existing in the inland districts of this country, where made roads are unknown, capital scarce, and the administration venal. Railways will no doubt afford the means of conveying more rapidly to market produce grown on lands contiguous to the lines, but this can only be a very small portion of the aggregate supplies; and a short distance from railway stations will, at certain seasons, suffice to act as an irrefragable barrier. Independent of this, it is well known that conveyance of grain by rail is a very expensive expedient in all parts of the world, and certainly not likely to be less so in Russia than elsewhere; but however efficient may be the railway service, and however low the rates of transport, the productive powers of the country will not soon be increased materially thereby. All surplus produce is now exported; to increase supplies sufficiently in ratio to affect prices will necessitate more extended industry, an augmented population, and also a much wider breadth of culture. These advantages will doubtlessly accrue to Russia in progress of time; that is, however, no reason why prices should become very sensibly reduced; experience, indeed, would rather indicate a contrary tendency. The quantity of grain now grown in Europe is greatly in excess of what was the case fifteen years ago, nevertheless it is not found that the increased production has depressed prices, a proportionately larger consumption having maintained the equilibrium. However this may be, British markets incur little risk of being inundated with grain from Russia. The United States are by far more capable of bringing about such a contingency by the energy, skill, commercial enterprise, and free action enjoyed by that people.

The exportation from Taganrog during the last five years was as follows:—

	1863.	1864.	1865.	1866.	1867.
Wheat .. qrs.	1,049,157	933,295	961,386	1,183,888	1,336,400
Rye .. .. ,,	29,651	1,554	4,733	94,952	346,289
Barley .. ,,	10,199	5,153	16,218	70,344	71,748
Oats .. .. ,,	..	13,424	13,552	75,588	..
Linseed .. ,,	190,658	191,846	146,607	193,227	206,629

A railway from the Don Cossack station at Aksai to Rostoff has not only been determined on, but actually commenced, before the public became aware of the decision. The unwonted promptitude with which this scheme has been adopted and put in execution, leads to the inference that Government is the principal promoter, although a Russian contractor, M. Poliakoff, is said to be the ostensible party. This railway will connect Rostoff with the coal-fields in the vicinity of Scherkask, and join the Voronege line, now under construction for that destination. There seems at present no idea of its being continued onward to Taganrog, a clear indication that advancement of trade is not the main object. It is supposed that the line eventually will cross the Don at Rostoff, thence proceed round the extremity to the southern side of the Azoff, and onward in a westerly direction to Anapa, on the Black Sea, pursuant to a plan suggested by the Grand Duke Michael, Imperial Lieutenant at Tiflis.

Agriculture.—It should not be inferred that the large production of grain in these parts for the last two years is attributable to an improved system of cultivation. In this portion of the empire land generally is unexhausted and exceedingly fertile, requiring nothing but adequate moisture and tolerably good husbandry to insure abundant crops. The deep furrow plough of Messrs. Ransomes and Sims has been found very effective, and is extensively employed;

other improved implements for clearing and pulverising the soil are likewise made use of on many of the well-organised estates, where attention is paid also to a proper selection of seed. But beyond such ordinary solicitude towards amendment, no movement is apparent, nor do any efforts seem to be made to obviate the aridity of the climate by plantation of trees, or throwing dams across ravines and declivities, for utilising the water that runs to waste during the moist seasons of the year. Steam-thrashing machines, now in common use, although of much service as a substitute for manual labour, and preparing more speedily grain for market, do not tend to increase production.

The emancipated serfs are peaceably settling down, and their labour will in the course of a few years sensibly increase the volume of agricultural productions.

Population and Industry.—Without statistical information there are no precise data to rely on. The usual computation of annual births is 5 per cent. of the fixed residents, and 3 per cent. of deaths, the greatest mortality being among the infants up to 5 years of age. Migration is considerable, numerous labourers being attracted hither from Central Russia to engage in town and field labour during summer, and at the fisheries in winter, but they have to return to their respective places of abode on the expiration of the term for leave of absence. The urban population generally is a very improvident class, prone to inebriety and other reprehensible habits, which are much promoted by the low price of spirituous liquors, and the numerous licensed drinking houses.

BERDIANSK, 1861.—Navigation closes early in December and opens early in March. Average price of soft wheat for the year 1861, 34*s.* 3*d.* per quarter; and for hard wheat, 33*s.* 9*d.* per quarter. Crops abundant, but inferior in quality to those of 1860, owing to very heavy rains during the spring and summer.

1862.—"Crops nearly a failure, owing to the total absence of rain during the spring and the devastation caused by locusts and other insects." Prices high; great losses sustained by shippers. Population improved, and the price of corn expected to be lower next year.

Average price of wheat for the year, 36*s.* a quarter.

1863.—Corn crops inferior in all districts. Many of the villages have been obliged to purchase corn for their winter consumption. Cattle of every description have been purchased for their hides only. A superior bullock realised about 1*l*, instead of 5*l*., and it is to be feared that a large portion will perish for the want of fodder during the unusually severe winter.

BERDIANSK. REPORT BY MR. CONSUL WAGSTAFF FOR 1863.—There are belonging to the town 9,910 acres of pasture land, 5,720 acres of cultivated land, which latter is let out on the average at 15*s.* per acre. This land, which was formerly very fertile, yielding 5½ quarters to the acre, at present, owing to no means being taken to enrich it, only gives from 2½ to 3½ quarters. This is not surprising, as the agricultural implements are of a very inferior sort, and no care is taken in selecting the wheat for seed. An English firm having established a depôt for the required implements, there is every appearance of machinery being more generally employed: the emancipation of serfdom, and the great scarcity of manual labour, having convinced the proprietors of the necessity of adopting this system. Some, however, are very tenacious as to the old manner of agriculture, and look upon the present innovations with little confidence. Irrigation is totally neglected, and direful indeed are the consequences. Owing to the long droughts of the past three years, the crops have been a complete failure, and, up to the present time, such is the aridity of the weather that the prospects of this year are very unsatisfactory. Should they for the fourth time prove a failure, the agricultural classes will be reduced to abject misery, as they have thrown their best resources into the

ground and have already taken advances they will not be able to meet, consequently a great deal of land will change hands. Besides the drought there are other more serious grievances resulting to the crops, locusts and field-rats destroy in part that which has escaped being scorched. The former of these much-dreaded enemies made their appearance in this district in 1856, and continued their visits annually, but, in 1862, they settled down to breed. This important fact was discovered by the inhabitants of the adjacent villages in the winter of the same year, but, from fear that they would be employed in exterminating them, they kept their fatal secret until it was too late. When they at last became fully aware of their danger, application was made for assistance; hundreds of carts and beasts were sent with crushers, but to little avail; the evil had already spread itself seventeen miles. Attempts were made to rake them into heaps and burn them, but without success. The rats at times also commit great havoc amongst the wheat, especially when they leave in droves for another part of the country, everything is levelled with the ground.

Report by Mr. Acting-Consul Wagstaff for 1864.—There has been a successive failure of crops in this part of Russia for the past few years.

Exports of wheat, 162,000 quarters; price in spring, 33*s.* per quarter on board. A fall of 2*s.* in England before the arrival of the cargoes discouraged our merchants, but the rise in foreign exchanges assisted them.

Several large parcels of wheat have been brought up in the Ekaterinoslaw and Poltawa governments, where the crops were abundant, for winter and spring delivery, at the low price of 12*s.* to 15*s.* per quarter; the cost of transport of which to Berdiansk will be 10*s.* to 12*s.* a quarter. The present stock of grain (72,500 quarters) is the smallest remaining in store after navigation has ceased for some years. Crops in the whole of the Tauride government a complete failure, owing to the drought in May and June. The Government distributed 150,000 quarters of corn to supply the wants of the farmers and furnish them with the means of sowing next spring. The Bulgarians are an industrious class of people. In the interior the crops have not suffered from the attacks of locusts, though in some places the rats have been very destructive; the quality of the grain was injured by extreme heat before cutting. Cattle have greatly decreased in the last five years through dearth of food.

BERDIANSK. Report by Mr. Consul Zohrab on the Trade and Navigation of the Port of Berdiansk for the Year 1866.—A year of commercial and agricultural success, such as is seldom experienced in this country, has just closed upon Berdiansk. An abundant harvest met a brisk demand, and grain realised very high prices.

Wheat is the chief article of export; compared with it, all other exports fall into insignificance. There are two kinds of wheat grown—hard wheat and soft wheat. The former is shipped principally for the Mediterranean ports. It costs here between 2*s.* 6*d.* and 3*s.* 6*d.* per quarter more than the soft wheat.

458,300 quarters of wheat were sent to foreign countries from this during the season, of which 115,252 quarters were shipped for the United Kingdom.

The export trade in other articles is very small. For linseed the climate does not appear to be favourable, and the returns are so uncertain that farmers do not pay much attention to the cultivation of the plant, and it is probable that its growth for seed will in a few years be abandoned.

Of oats four or five cargoes are annually exported. This cereal is generally grown for local consumption and not for exportation. The other exports are so insignificant that they can hardly be said to form articles of foreign trade. It is not that some of them cannot be found within the district in larger quantities; but as better prices are offered in other Russian towns, they are sent to them instead of being brought to this market.

Agriculture.—Several years of bad crops here and low prices abroad had brought poverty on the town. Exporters could with difficulty get small

profits out of their limited transactions, and some were reduced almost to bankruptcy. Of the lower classes, many left the town for places offering better prospects. Many believed that the days of Berdiansk as a commercial town were numbered.

One exceptionally good harvest, assisted by a brisk demand from abroad, and extraordinarily high local prices, has effected a salutary change. Every one engaged in trade or field labour has profited well during the past year. The local corn-dealers, who purchase from the growers and sell to the exporters, realised handsome profits, while the net gains of the exporters varied between 3000*l.* and 30,000*l.* to each house.

Labourers were glad in the early spring to find employment at 1*s.* per diem; from July, however, they received 3*s.*, 4*s.*, and even 6*s.* per diem, while women earned from 2*s.* to 4*s.* Indeed there was such a scarcity of hands that farmers offered high prices to every one who would work; and during the harvest numbers of house servants left their situations and went to the fields.

KERTCH. REPORT FOR THE YEAR 1861.—The agriculture of this district is very insignificant, owing to the scarcity and high prices of labour, and the produce does not suffice to supply the wants of the increasing urban population. Day labourers receive 2*s.* 10*d.* to 3*s.* 6*d.* per day; mechanics much more. Grain-vessels from the Sea of Azoff have to be lightened over the bar of Yenikale, which is done by unloading a portion of the cargo into small lighters.

Merchants complain of loss of grain from robbery.

1863.—Exports small.

December 31, 1866.—Prices of necessaries have risen considerably. Crops, consisting chiefly of wheat, oats, and barley, abundant here as well as throughout the Crimea. Vegetables, dear at all times at Kertch, are sold at a fabulous price during the winter months. A fine cabbage sold by the pound, will cost about 3*s.*

ADRIANOPLE, 1864.—The surplus of the products of the districts of Thrace is carried to Gallipoli in bullock-waggons in summer, and by pack-horses in winter.

Two-thirds of the exports are floated down the river Maritza in rafts to Enos; these are rudely constructed, and carry 20 to 30 quarters of grain; they are broken up and sold when unloaded at their destination.

CORN TRADE OF THE BALTIC.

DANTZIG. REPORT BY MR. CONSUL WHITE, 1865.—The arrivals of various kinds of grain were stated approximately, in 1865:—

	Wheat.	Rye.	Barley.	Oats.	Peas.
	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
From Poland	398,000	180,000	..	..	..
From this country	285,520	108,490	62,490	18,830	43,240
Stock at the end of 1864 ..	201,000	21,900	3,500	800	1,500
Total	884,520	310,390	65,990	19,630	44,740
Exported by sea in 1865 ..	723,050	245,950	33,470	..	36,550
Exported inland	6,470	4,740	1,120	360	190
Local consumption	15,000	40,000	28,000	18,000	4,000
Waste	7,000	2,800	600	70	400
Stock at the end of 1865 ..	133,000	16,900	2,800	1,200	3,600
Total	884,520	310,390	65,990	19,630	44,740

The average quantity of wheat exported for British consumption during the last five years was 558,000 quarters.*

In 1862 the harvest was good in Poland, and the exports larger than in any former year, viz., 830,000 quarters of wheat, and 440,000 of barley. The greater portion of the wheat came to Great Britain, and scarcely any rye or barley. The trade turned out unprofitable to merchants, owing to large American supplies and a fall of 14*s.* a quarter in the price of wheat.

Railway traffic is open to Warsaw with continuation to St. Petersburg. This, and the river navigation of the Vistula and the Bug, make Dantzig the emporium for the products of Poland.

"During the fifteen years since the abolition of the sliding-scale in England, if we omit the years of 1855 and 1856, when the trade in corn was fettered by Russia, owing to the Crimean war, we find that 7,000,000 quarters of wheat were exported from Dantzig."

A considerable trade in rye is carried on between Dantzig and other Northern German ports, as also with Sweden and Norway. 28,000 quarters of barley were shipped to England in 1865.

Almost all the wheat which is of superior quality goes to England, a small quantity (say 80,000 quarters) to Holland and Belgium. Sweden and Norway take more than half the export of rye, and the Dutch and German ports nearly all the remainder. The local consumption of rye is 40,000 quarters; of wheat only 15,000 quarters.

KŒNIGSBERG.—*Exports in* 1861.

Wheat	354,000 quarters.
Rye	458,000 ,,
Barley	106,000 ,,

Imports from Russia and Poland by river, rail, and land-carriage :—

Wheat	612,000 quarters.
Rye	180,000 ,,
Barley	9,900 ,,

The crop of 1860 was an unusually good one, and these exports exceed in value those of all former years. The corn merchants have lost by their transactions.

1863.—"The harvest was considerably above an average." Large quantities of grain arrived here by land from Russia and Prussia. "The exportation of wheat to England was only about half that of the year 1862, and as the prices in England are ruling ones, a continued depression in value was the consequence."

The total exports of grain of all sorts shipped from Kœnigsberg have been :—

	Imperial Quarters.		Imperial Quarters.
1860	993,000	1864	800,000
1861	1,123,000	1865	450,000
1862	907,000	1866	800,000
1863	973,000		

Exportation of Wheat only.

1864	163,000 quarters.
1865	176,000 ,,

About half these quantities came to England during these years of bad harvests.

* In 1866, 583,000 quarters of wheat were exported from Dantzig,

Grain is the chief article of export of the province. The insecurity arising from the German-Danish quarrel, and the prospect of a possible blockade, caused a pressure to ship, which told on prices and made the trade unprofitable. "The harbour works at Kœnigsberg and Pillau are now the subject of great reform plans, which, in connexion of the proposed railways, are expected to facilitate commerce and to double the trade of Kœnigsberg-Pillau. The general feeling is that a great commercial future is in store for Kœnigsberg. The value of property has increased wonderfully during the last few years, and the population likewise."

KÖNIGSBERG.—Mr Consul W. J. Hertslet's Report for 1866.—*Freights* did not vary much. They commenced with 2*s.* 9*d.* to 2*s.* 6*d.* to the east coast of England, with 3*d.* to 6*d.* less for coal harbours, per quarter of 500 lbs. of wheat, and rose about 9*d.* per quarter in June and July; and in October the quotations of freights were 4*s.* to London for sailing-vessels, and about 6*d.*, and latterly 1*s.*, more for steamers to London. The depth of water on the bar at Pillau has gradually decreased from its greatest depth in 1862 of 22 feet Rhenish to 19 feet 6 inches in 1866, or, at close of 1866, about 20 feet English measure. But measures are contemplated to improve the depth again, and will probably be carried out, as the importance of Pillau as the nearest available seaport for the Russian empire is daily becoming more clear. The commerce of East Prussia alone would, of course, not be of so great importance, but the merchants of St. Petersburgh, Riga, and other Russian places, have already commenced to quote the prices of their export articles during the winter months, "free-on-board at Pillau," and the import of goods for Russia at Pillau is already very considerable.

The commercial year 1866 commenced in a most gloomy manner, and the gradual approach of war with Austria, which threatened the very existence of Prussia, and before it actually commenced, was most unpopular, and caused the greatest consternation and distress, not only in commercial, but in all classes. Count Bismarck and his policy were execrated, and the military system of Prussia, which tears away all—fathers, sons, brothers, husbands, often the sole support of those they leave behind—to make soldiers of them, without any mercy and without any means of living during their absence, or any provision for widows and children in case of mutilation or death, was put to a trial which any reverses would soon have made insupportable, but it pleased Providence to give success to the Prussian arms. Not only success on the fields of battle, which might have been looked for from the better armament of the Prussians, but also the success which was beyond all hope, and yet without which no victories could have helped Prussia. This success was the rapidity with which the drama was acted. The state of Prussia, even if victorious, if the war had been protracted for any length of time, must have been beyond description; as it was, the rapid intelligence of one victory after the other naturally called forth a spirit of exultation. Private misery was forgotten, and the very parties who had blamed Count Bismarck's policy the most, went over *en masse* to the exactly opposite opinion. The Prussian system of general and universal military liability may be an excellent one to repel foreign aggression, or for a short and victorious campaign, but for misfortunes or prolonged warfare, it is difficult to imagine any system which could so soon and so radically ruin a country. These remarks are of course from a purely commercial point of view.

From extreme radicalism before the war, Königsberg went over to ultra-Royalism, and, with universal suffrage, the Commander-in-Chief of the First Armée Corps and the Royal Landrath, or Prefect, were elected to represent Königsberg at the North German Parliament. The victories of the Prussian army and the enormous number of prisoners of war which arrived at Königsberg and vicinity may account a good deal for this. From a military point of

view, I am not able to offer any remark as to the Prussian military system, but in a commercial sense, from what I have seen, I cannot imagine anything which must so completely eat up and destroy a country in case of any protracted hostilities. Merchants, farmers, artificers, workmen, clerks, all, all were in the army, and the effects which must have ensued in case of reverses would be a picture which man cannot draw. Those that remained behind must indeed thank Providence that their relatives were mostly so speedily restored to them.

ROSTOCK.*—*February 7th*, 1862.—A brisk demand for wheat in France in the middle of 1861, and stocks in Rostock rose in price, but England got most of the exports of the year, viz., 107,000 quarters.

Crop of wheat in 1861 deficient in quality; the exports of 1862 will be small. Rye was a better crop.

Barley, peas, oats, and rape-seed, were below an average.

Exports of wheat in 1862, 77,000 quarters; of other grain hardly any.

Cattle had been carried off by a "sort of scurvy;" sheep by the small-pox. "Population covers the country but thinly, and is getting more and more thin in consequence of emigration to foreign countries." A harsh feudal Government (Mecklenberg) allows of no free settlement, and makes even matrimony difficult and dependent on the permission of the feudal sire.

1863.—"The corn trade, which constitutes the whole export business of the ports of Rostock and Wismar, has been lively in both, owing to the excellent crop of 1863 and to accumulated stocks from the year 1862." Total export of grain, 116,000 quarters in 168 vessels. The independent classes of agriculturists are prosperous, but the labourers and poor farmers are under great dependency and oppression, and their interests are extremely neglected, as the legislature is entirely in the hands of the landed proprietors. These classes are therefore emigrating, and a gradual decrease of the population is the result. Mecklenberg is solely agricultural.

1864.—The low prices which have ranged for corn during the last three years have in a great measure hitherto been compensated by the brilliant result in the productiveness of the soil; besides, butter, wool, and cattle, could always be sold at well-remunerating or even very high prices.

Great uneasiness prevails amongst the landed proprietors and farmers on account of the constantly-increasing emigration of the labouring classes of this country. This has been so general during the last years, in spite of the American war, that during the time of harvest operations hands were generally scarce, and it is feared when the war in America ceases emigration will take much greater dimensions still.

The causes of emigration are, therefore, much discussed in this country; and the legislature, instead of lightening the burdens of the labouring classes by granting free settlements, and free trade, and choice of profession, would like to check emigration by making the poor classes still more dependent of their lords and patrimonial sires. The legislature is fully in the hands of the latter, and for the present there is not much aspect that they will come to better insight.

ROSTOCK.—*Exports in* 1865.

Wheat	118,846 quarters.
Rye	24,000 ,,

Little other corn or pulse.

The deficient crop had little effect on exports, as the stocks from the year before were large.

* Rostock draws its supplies from a more limited area than Dantzig.

Decennial Average Prices from 1855 *to* 1864 *inclusive.*

	s.	*d.*
Wheat	46	8
Rye	31	1
Barley	23	0

MEMEL, 1861.—"This port suffers from the want of land and water communication with the interior." "Wheat was not exported at all in 1861, the small quantity which reached our market being sufficient to satisfy the local consumption."

1862.—There is a complete system of water communication between this port and the Black Sea; and the rivers, with their connecting canals, traverse the finest and most beautiful provinces of the Russian empire, possessing inexhaustible riches in animal, vegetable, and mineral produce. The harbour is also the best, or one of the best, in the Baltic, and its communication with the sea is never impeded by ice. But in the absence of railway communication Memel can never export much corn, because the inland water communication is closed by ice in October, and the produce of the new crop in Russia cannot arrive till May, or even as late as August and September from the most distant provinces. And in Russia money costs from $1\frac{1}{2}$ to 2 per cent. per month. Warehousing and insurance are also very high and hazardous. Therefore Russian producers prefer sending their goods by railway to Kœnigsberg for the advantage of a quicker market.

1863.—During the past year our principal channel for transit, the river Niemen, was so shallow (and in fact is yearly becoming more so) that a large quantity of grain destined for our market did not reach it. It is beyond a doubt that the grain trade of Memel will decrease from year to year until its magnificent harbour becomes connected on the south with the province, and on the north with the Riga and the intermediate fertile districts of Russia.

The entire export of wheat during the year was about 200 quarters, against 800 quarters in 1862 and 900 in 1861.

In 1865, 21,000 quarters of rye were exported, chiefly to Norway, and hardly any other corn.

STETTIN-ON-THE-ODER, 1861.—Trade much improved in the last five years. The Oder Union Society, established to improve the navigation of the river and render it navigable for barges from Breslaw to Stettin throughout the year. Exports of grain in 1861 large, owing to bad harvests in England and France. Total quantity of grain and peas exported, 800,000 quarters.

RIGA, 1863.—No wheat exported. Both rye and barley were too dear for export. 100,000 quarters of oats were exported; all of which, except 76 quarters, came to Great Britain. Average price of oats for the year 13*s.* 1*d.* per quarter.

1865.—Yield of corn always uncertain in this district.

Total export of corn in 1865, 103,700 quarters, of which one-half went to Holland. Prices of wheat, 43*s.* 6*d.* per quarter. In 1864 the exports were 298,267 quarters.

LUBECK.—Although the harvest of 1862 has not been so good as was expected, still it was in this vicinity a satisfactory one, and only barley and buckwheat may be considered as very moderate. In corn no great business could be done, as on the Continent there was no great demand.

"The grain harvest of the year 1863 was a plentiful one in the neighbouring provinces. The prices of grain have sunk so very much that they can scarcely go any lower."

1864.—In consequence of the rich harvest in Western Europe, and also of the bad quality of grain in Northern and Eastern Europe, the export to England

and France has almost ceased. The German agriculturists are therefore sufferers in a double respect. The rust and rain have decreased the quantity, injured the quality, and at the same time prices have fallen considerably when compared with those of last year, and stand in no proportion to the high rents paid in the preceding years. It is therefore high time that the incomes of the agriculturists should increase if bankruptcies are not to take place amongst them.

WIBORG. REPORT FOR 1861.—Last year's crop of rye and oats have been rather small, yet some oats have been exported to England. It ought to be remarked that Finland annually imports large quantities of rye and rye-flour from Russia, and that the quantities of corn exported from Finland, if any, are small. The prices of oats varied from 25*s.* 6*d.* to 28*s.* 4*d.* per imperial quarter. Very little wheat is grown.

1862.—Crops of grain in Finland suffered severely, and in many cases in the Midland and Northern Provinces were totally destroyed by early frosts. Many people died of a singular form of sickness, occasioned by living on the wet corn. The Senate advanced money for the purchase of corn to feed the people. The distress was even more general than in 1856.

For a series of years there has not only been a partial, but frequently a total failure of the crops in the northern provinces; and notwithstanding the large sums which are annually spent by Government in endeavouring to dry the extensive morasses in those districts, it is to be feared that Finland will not be able to produce a sufficiency of grain for its own requirements.

NORWAY.

CHRISTIANIA. REPORT FOR 1861, BY MR. CONSUL-GENERAL CROWE.—The exportation of oats increases; all other cereals are imported for home consumption. Among these, rye and rye-meal figure more largely than wheat and wheaten flour.

Although Norway has many climatic and physical difficulties to contend with, she still is essentially an agricultural and pastoral country. Farmers here, however, as in most other countries, are a dogged set, wedded to the system handed down from father to son. Their implements, until within the last three or four years, were, as they still in fact are in the most sequestered spots, of the most primitive description, and in those localities agriculture appears in its infancy; but in the neighbourhood of the capital and its surrounding districts, great and important improvements have within these few years been generally introduced. An extensive system of subdraining, which had been universally neglected before, under the impression that frost admitted only of surface-draining, has now been successfully applied; implements of the most modern and improved description have been substituted for the rude and primitive descriptions previously in use. The consequence has been that increased and remunerative results have followed, and sanguine hopes are entertained that at no distant period Norway will, as Sweden now does, be able to grow cereals of one description or other sufficient for her own consumption.

Oats and barley appear pre-eminently suited to the soil and climate, and quantities of the former have of late years been exported and obtained remunerative prices.

An interesting proof of the climatic immunities enjoyed by Norway may be inferred from the fact that the barley grown last year at Alten, in latitude 70°, was considered of such superior quality that parties sent from the Gulf of Bothnia, a distance of about 300 miles overland, in order to purchase seed, paid on the spot at Alten 45*s.* sterling per imperial quarter.

According to the last official return, it is estimated that there are about

710,000 acres under cultivation. The total quantity of cereals harvested, after deducting the seed sown, amounted to about 1,566,700 imperial quarters, besides about 1,795,000 imperial quarters of potatoes; showing an increase since the last decennial Report of 33·21 per cent. on the former, and 28·83 per cent. on the latter; while the population had only increased 12·16 per cent. The increase at the same time of the quantity of seed sown was only 14·89 per cent., which will indicate that material progress is and has been in operation, consequent upon the improved system of cultivation introduced.

Great attention has likewise been paid to the improvement of the breed and feeding of cattle; the effect is evident in the capital by the striking improvement that is perceptible in the quality of butchers' meat generally. According to the last official return, it appears there were in the country the following stock, viz.:—

Description of Animals.	Number.	Increase per Cent. since last Report.
		Per Cent.
Horses	154,447	17·10
Horned cattle	949,953	12·74
Sheep	1,596,199	10·29
Goats	357,102	22·74
Swine	113,320	27·85
Reindeer	116,891	29·49

Great and continued care is being devoted to the selection of the best foreign breeds, with a view to the improvement of the native stock. The result, as far as experience hitherto warrants, appears to have been as favourable as could be expected.

1863.—With a population of little more than a million and a half, 2,410,475 quarters of corn, &c. (reduced to the barley standard value), were consumed; thus the growth of the country supplied nourishment for 1,100,000 persons, while about 400,000 were supplied by foreign importation. "It must be borne in mind that between 150,000 and 200,000 quarters are consumed in the production of beer and spirits."

The import of corn has continued steadily to augment.

Sufficient oats and potatoes are grown in the country to supply its wants; indeed the export of the first-named article has commenced of late years. The imports, then, consist of barley, rye, and wheat.

1865.—*Imports into Norway.*

Wheat	38,760 barrels.*
Rye	795,469 ,,
Barley	596,199 ,,
Flour	191,600 cwts.

Norway received her supplies of corn and meal almost exclusively from Russia, Prussia, and Denmark. But since the Treaty with France, large quantities of rye have been shipped from that country. The population steadily increases; at a census taken at the end of 1865 it reached 1,701,561.

SWEDEN.

GOTHENBURG, *June* 19*th*, 1862.—Exports of oats in 1861, = 133,400 quarters, of which 114,000 quarters to England.

Harvest of 1861 far below an average, and the export of oats in 1862 will fall far short of former years. An import of 100,000 quarters of rye (more than for twenty years) took place, owing to the bad crop of 1861.

* A barrel is rather less than 4 bushels.

Considerable improvements in agriculture are taking place, such as draining, improvement of live stock, &c.

STOCKHOLM, 1868.—REPORT BY MR. CONSUL GERALD PERRY.—The most fertile parts of Sweden are the plains of Skane and Ostergötland, part of Westergötland, Södermanland, Nerike, Wermland, and Upland. It is in these provinces that agricultural pursuits are principally followed; but they are also exercised, although on a smaller scale, in several other parts of the kingdom. The province in which agriculture in this country has at present attained its highest perfection, is Skane. Generally speaking, agriculture in Sweden is in a state of progression. Complete statistical reports are only available for the year 1865, previous to which time reliable information cannot be obtained. The following statement is, therefore, grounded on approximate statistical reports for the year 1865 :—

The superficial area of cultivated soil, constituting 9 per cent. of the area of the entire kingdom, is in round numbers 11,000,000 acres, of which 55,000 acres constitute building plots and gardens, nearly 6,000,000 acres arable land, and 5,000,000 acres meadow and pasture.

During the year 1865 the proportion between the seed sown and the crops reaped was as follows :—

—		Seed Sown.	Crops Reaped.
Grain	Cubic fot	13,967,000	73,631,500
Leg Pulse ..	„	596,700	2,427,600
Potatoes	„	7,667,800	47,234,000
Other Roots ..	„	..	3,997,000

The following comparison between the surplus left for exportation in 1866, after deducting the quantity required for home consumption, and the average annual surplus during the decennium 1856 to 1866 gives an approximate view of the extent to which the produce and exportation of grain are increasing :—

Average of the Years.	Surplus left for Exportation.						Total.
	Wheat.	Rye.	Barley.	Oats.	Meslin.	Peas.	
1856-66 cubic fot*	107,407	..	1,382,119	7,245,613	11,527	27,776	8,774,442
1866 .. „	221,821	174,090	1,636,110	10,143,900	25,301	21,525	12,222,747

Forest Produce.—It has been shown above that only 9 per cent. of the entire area of land in Sweden is cultivated, the remaining 91 per cent. consists chiefly of forest land.

Hitherto immense quantities of wood and timber have been exported, but a reduction in this article of export is likely soon to take place, as the forests in the more populous parts of the kingdom consist chiefly of young wood; and the forest districts in the northern parts, situated along the lines of communication, are said to have been ravaged to a great extent.

INFORMATION FOR PERSONS WISHING TO PURCHASE LAND IN SWEDEN.

1. A British subject can hold real property in Sweden, on special permission being granted by the Crown, and which permission has never yet been refused.

2. There is not, strictly speaking, any other tenure than freehold, with the

* 1 cubic fot = 1597·2 cubic inches, and 11 cubic fots = 1 quarter, nearly.

exception of some little Crown property which is held during the pleasure of the sovereign, or for the life of the tenant, and in some cases with the possibility of renewal to the next heir. Leases beyond the term of a few years are very uncommon.

3. The value of real property is determined, not by any number of years' purchase, but by the capital represented by the annual revenue. The net revenue, taken as 6 per cent. interest, will usually give the normal value of land and house property. At the present time, in consequence of the great scarcity of money, good estates may be bought, *for cash*, at two-thirds of their normal value.

4. When estates or plots of land are farmed out, the value is paid either in currency or in kind, or in both, according to agreement.

The system of allotting out estates into farms is somewhat rare in Sweden. Owners generally cultivate their own land.

In 1865 a new article began to be exported into Great Britain and Ireland, viz., cattle. In 1866 the exportation of cattle and sheep increased on the previous year, but that of pigs decreased. The exportation of horned cattle from Sweden may be expected to increase still further as a great part of the country is particularly adapted to the breeding of cattle, and this branch of industry has only of late been carefully attended to.

Population, 4,114,141.

REPORT BY MR. CONSUL ENGSTURN, *June* 13*th*, 1866.—Harvest of 1865 in this district an average for winter seed. Price of wheat for the year 38*s.* per quarter; barley, 21*s.*; oats, 16*s.* The exports of grain from Gothenburg, in 1865, 290,100 quarters, which, together with that from the other ports of this consulate, make a total of 1,057,950 quarters, being 163,250 quarters in excess of 1864.

Cattle.—The very high prices in England, consequent on the prevailing cattle plague, have given an impetus to the export of cattle and butchers' meat from Sweden.

ARCHANGEL, 1862.—A cold summer and early autumn frosts almost entirely destroyed the crops in this government. The peasantry had to kill an unusual number of their cattle and sheep from insufficiency of food; a misfortune which will not end with one year. The imports of wheat vary from 2000 quarters to 13,000 quarters a year. "All over the government there was a failure of this crop in 1865, and it required strenuous efforts, and a heavy expenditure on the part of the government, to prevent an actual famine."

BELGIUM.

The following table exhibits the amount of flour and grain imported into Belgium during the years 1860 to 1863:—

Articles.	1860.	1861.	1862.	1863.
	Quarters.	Quarters.	Quarters.	Quarters.
Wheat	499,153	637,425	250,000	300,000
Rye	285,563	153,766	..	..
Oats	91,210	133,314	..	..
Buckwheat	6,333	2,784	..	..
Maize	427	2,567	..	..
Barley	308,342	300,973	..	..
Peas, lentils, beans and tares	14,675	29,610	..	..
Flour	97,627	94,528	..	..
Total	1,303,330	1,354,967	250,000	300,000

The following is the official return of the production of corn in Belgium :—

Average per year for the three years ending 1865.

Wheat	1,636,860	quarters.
Spelt	353,618	,,
Mixed corn	225,849	,,
Rye	1,466,970	,,
Buckwheat	209,916	,,
Total	3,893,213	,,

HANOVER, 1866.—Hanover exports nearly every year a small amount of various sorts of grain.

The Hanse Towns: Bremen and Hamburgh.

Territory very small, and the agriculture chiefly grazing. The grain required for consumption is chiefly brought from Hanover, Mecklenburg, &c.

HAMBURGH, 1861.—The harvest for 1861 was abundant throughout Germany. Very large quantities of corn were exported from Hamburgh and Baltic ports to Great Britain, France, and other countries, and the stocks in warehouse at the close of the year were nevertheless considerable. The reduction of the rates of freight on most of the railways, and the alterations in the French corn law, whereby fixed duties were substituted for the sliding-scale, were circumstances which could not but tend to the expansion and security of the German corn trade; a trade still of great importance, although its character has so much changed since the abolition of the English corn restrictions and the consequent opening of the English ports to grain and flour coming from America and all other parts of the world.

As there was a deficiency in corn in 1861, in other countries, prices rose considerably, so that unusually large quantities were brought to Hamburgh and sold chiefly for exportation in the course of the year.

Navigation is sometimes interrupted by ice on the Elbe, but not in 1863.

1862.—A good harvest in 1862 in Germany generally somewhat reduced the prices of the necessary articles of consumption throughout the country, and promoted exportation. 301,720 quarters of wheat were brought to Hamburgh in the year 1862, chiefly from the interior of Germany, either by the Elbe or by railway, in transit for exportation. The total transactions in corn (valued at one million and a half pounds sterling), at Hamburgh, were nearly one-third less than in 1861, when the business was extraordinarily large.

1867, Corn Trade.—The extent of the corn and flour trade of Hamburgh, will be seen in the following statements of the quantities imported. The time when large quantities of corn were kept in warehouse here ready for shipment at short notice has passed away, in consequence of the abolition of the English protective system, and the supplies are now forwarded hither from the interior, as occasion may require, chiefly by the Elbe and the Berlin Railway, and are shipped at once for British or other foreign ports.

		1865.	1866.	1867.
Wheat	(qrs.)	280,000 ..	330,000 ..	480,000
Rye	,, ...	100,000 ..	132,000 ..	125,000
Barley	,, ...	100,000 ..	150,000 ..	209,000

Zollverein Renewed.—The German States lying to the south of the River Maine preserved, as is well known, their independence after the war of 1866,

and were not under any obligation to unite themselves either politically or commercially with Prussia, or even to renew the Zollverein which the war had dissolved.

HANSE TOWNS REMAIN FREE PORTS.—The Federal Constitution became law in the Hanse Towns on the 1st of July, 1867. In consideration, however, of the peculiar position of the Hanseatic cities, they have been permitted, by a clause of the Federal Constitution (Article 34), to remain as free ports outside of the Customs frontier, until they shall signify their own desire to be admitted within it. But for this privilege they are obliged to pay an annual sum, called an *Aversum*, equivalent to the amount of Customs duties which would otherwise have been levied within their respective territories. The *Aversa* for the year 1868 have been fixed as follows:—For Lübeck 85,950 dollars (12,900*l.*); for Bremen 248,600 dollars (37,290*l.*); and for Hamburgh 710,160 dollars (106,530*l.*). It is understood that Lübeck will speedily put an end to her *Aversum* by procuring the admittance of her territory into the Customs Union; but the circumstances of the two larger cities of Bremen and Hamburgh are different, and they conceive it to be their interest to maintain the freedom of their ports, at least until by the construction of proper bonded warehouses and quays, they shall be in a situation to submit to the Customs Tariff, combined with the advantages of a good *entrepôt* system. The harvest of last year was below the average in Germany as well as in a large portion of the rest of Europe. The high price of bread and of the other necessaries of life has pressed hardly upon the working-classes, and greatly limited their consumption. Indeed, towards the close of the year the distress in the eastern provinces of Prussia was known to be so severe and widely spread that the government was obliged to come to the relief of a starving population, and likewise to appeal to the aid of private benevolence.

Hamburgh and its neighbourhood have not indeed been afflicted by famine, but the prices of necessaries have been gradually rising, and the prospect of increased taxation is not a favourable one either for the wages of labour or the profits of trade.

SOIL AND CROPS.—The harvest of last year was deficient in the Hamburgh territory, as it was likewise in the surrounding districts belonging to Prussia and Mecklenburg. In fact, when the corn came to be threshed out it was found that the yield was even less than had been expected in the autumn, and in some of the most fertile parts of the country the rye (on which the population chiefly subsists) did not return more, on an average, than the fifth grain of corn. The consequence was that many farmers were left without seed-corn, having entirely exhausted their winter stock.

The actual prices, especially of rye, are so high as to show that great scarcity still prevails in Germany. Much has been done by the Prussian Government and by individuals to relieve the severe distress which has affected the eastern provinces of Prussia; but such efforts cannot cheapen the necessaries of life. And throughout Northern Germany the people have been more in want of bread during the past winter than at any since the scarcity of 1847.

NETHERLANDS.

AMSTERDAM, 1860.—The breeding of cattle and the making of butter and cheese have been more profitable than the tilling of land, partly from the high prices that could be obtained for them; and this accounts for the fact that pasture ground is continually rising in price while the arable is almost at a standstill, and even in some parts diminishing in value, though upon the whole no very important variations have arisen. The manure generally used is stable dung and mud from ditches; guano and artificial manure are seldom employed.

1863.—"Reports from all quarters have been on the whole satisfactory. With regard to the breeding of cattle, improvement becomes apparent every year. Over the whole of the district, formerly the lake of Harlem, agriculture is making rapid strides."

ROTTERDAM, FEBRUARY, 1867.—The outbreak of the rinderpest has been, and unfortunately continues to be, a scourge of terrible severity to this country, which consists almost entirely of meadow and grazing land.

The measures taken at the commencement were not sufficiently stringent, and the consequences of a mistaken leniency are now being felt throughout the kingdom.

It is true that the present government are doing their utmost, by the application of a sterner policy, to remedy the faults of their predecessors; and by strong repressive measures, a total prohibition of the movement of cattle from infected districts, military cordons, wholesale slaughtering of all the live stock in an infected farm, &c., it is hoped that the plague may be stayed.

The official returns, however, show a lamentable number of cases, as will be seen by the following table:—

—	Total Cases.	Died.	Slaughtered.	Recovered.	Doubtful.
South Holland	78,585	34,604	14,707	27,148	2,126
North Holland	5,870	798	4,279	793	..
Guelderland	1,350	22	1,247	..	6
Utrecht	43,591	25,236	3,479	12,900	1,976
Since the first outbreak	129,396	60,660	23,712	40,841	4,108

The energy with which England has met the case has, as may be supposed, attracted great attention; and public opinion amongst the farmers and stock-holders, which has hitherto always opposed the Government in repressive measures, is gradually coming round to the necessity of a strong and decisive policy.

JULY, 1868.—Farmers have been compelled to import cattle from neighbouring provinces, and even from abroad, to replenish their stock, reduced by cattle-plague.

SAXONY.

LEIPSIG. REPORT BY MR. CONSUL-GENERAL CROWE FOR 1865.—Harvest of 1865 a bad one in Saxony, which was an importer of corn to a greater extent than usual, competing with Prussia, in which the harvest was but three-fourths of an average, for the supply that poured in from Prussian and Russian provinces. For several weeks in autumn the railways throughout Germany were busy beyond precedent, carrying wheat and rye. One house in Berlin contracted to deliver 500,000*l*. Hungarian corn alone. This great importation and the surplus of previous good harvests have caused low prices and loss to farmers.

The cause of a bad harvest in Saxony and Russia, in 1865, was the heat and moisture of the spring and a rapid thin growth of straw followed by a burning summer. Several years previous had been dry, and for two seasons no water had flowed from the pipes of the well-drained Saxon fields. Want of forage favoured the exportation of cattle, and the rinderpest in Holland and England gave a new impetus to it.

Price of wheat per quarter, 1865:—April, 37*s*. 9*d*.; July, 39*s*. 2*d*.; Sept., 41*s*. 4*d*.; Dec., 47*s*. 10*d*.

Not far from Leipsig the hills above the valleys of the Saale and the Elbe are clothed with vineyards. The cultivation is extending. The wine is good in hot seasons; it is sent to Magdeburg and worked up as Bordeaux. Price of Must, 8*d.* per quart.

France.

MARSEILLES. Report by Mr. Consul Mark for 1861.—A very large importation of wheat and grain was effected at this port in 1861. In the last six months of the year 1,547,640 quarters arrived from the Black Sea and Sea of Azof. The short crop of 1861, and the abolition of the sliding-scale in France, conduced to this large importation of wheat, which, under the circumstances, it was expected would have been much larger. But, about the month of November, the Marseilles merchants found, much to their surprise, that very large quantities of wheat were being poured into France by the eastern frontier, the continental railways having offered greater facilities for the conveyance of grain; prices fell, therefore, to such an extent that the Marseilles speculators in grain lost very considerable sums of money. The increasing railway facilities throughout Europe, and the prevalence of steam navigation, as well as the large production of wheat in America, the Baltic, and other grain-producing countries, which can now be easily poured into French and foreign ports whenever required, render it unlikely that Marseilles will ever again see so large an importation of wheat as occurred during the last season, which was almost entirely drawn from the Black Sea and Sea of Azof.

Table showing amounts of wheat imported at Marseilles :—

	Quarters.		Quarters.
1852	695,400	1858	1,072,204
1853	1,406,600	1859	696,253
1854	905,880	1860	475,112
1855	860,720	1861	2,063,520
1856	1,864,250	1864	971,437
1857	1,479,955	1865	834,253

The great facilities afforded by the Marseilles market for the importation of the various qualities of wheat, from the Black Sea and Algeria, have led to the establishment of numerous flour-mills and to a large manufacture of semolina. About sixty flour-mills, furnished with 400 pairs of mill-stones, grind annually about 687,840 quarters of wheat, thus giving employment to numerous hands, it being altogether a most thriving business.

BORDEAUX, 1862.—The culture of the vine carried to the highest state of perfection; otherwise agriculture is in a backward state, owing to the increasing division of landed property and the prejudices and routine of the peasant proprietors.

The price of all commodities, except bread, is excessively high; wages have risen, habits are becoming more expensive, and the "times are hard" for the middle classes, though not for the lower.

DUNKIRK, 1861.—"Improvements in the system of husbandry are gradually being introduced, and great attention is paid to the breeding of animals. This department is in advance of most others in France in these matters, and cultivators are giving their attention to draining and extensive manuring. They are all beginning to discard the custom of leaving the ground in fallow, and are more particular about a judicious change of crops." Potatoes are largely exported: the Consul has introduced some of the best seed from Scotland, believing that growers are in error in exporting the best potatoes and

planting the worst, and that a change of seed is desirable in a plant so affected by disease.

HAVRE, 1861.—Drainage, turnip culture, and a judicious rotation of crops, are very little practised in Normandy. The farms are generally small—5 to 15 acres—and the farmers embarrassed. "The sheep are a long-legged bony breed that have never been improved. Turnips are unknown as an esculent to fatten animals."

CORSICA, JULY 1866.—The products of agricultural industry are lemons, oranges, chestnuts, olive oil, cork, dried vegetables, lupine-seed, tobacco, silk, raisins, wines, wool, hempen-seed, bark for tanning, fire-wood, timber, and wax. All of these are exported. Corsica does not in the best years produce half the food necessary for its population. Flour is imported from Marseilles, equal to about 50,000 quarters of wheat a year.

Consular Reports from the Countries of the Mediterranean.

ITALY.

TURIN. REPORT OF MR. CONSUL COLNAGHI ON THE AGRICULTURAL PRODUCE OF LOMBARDY IN 1866.—*Cultivated Land.*—The extent of land under cultivation in Lombardy is calculated at about 2,743,564 acres, which may be thus classed:—

	Acres.
Meadow lands	621,363
Rice fields	153,690
Wheat, maize, oats, rye, vines, &c...	1,968,511

The average annual production of Lombardy is estimated as under:—

*Wheat	imperial qrs.	6,706,050
Rye	„ „	155,755
Oats	„ „	105,233
Indian Corn	„ „	1,031,700
Barley	„ „	16,851
Rice	tons	34,456
Millet	imperial qrs.	92,853
Hay	tons	944,832

Wine.—Before the appearance of the oïdium, the average quantity of wine produced in Lombardy was estimated at 27,031,499 imperial gallons; at present it is less than one quarter of that quantity.

The Vine.—The cultivation of the vine, never so important a branch of agricultural industry in Lombardy as in the neighbouring provinces, is greatly decreasing.

Silk.—The produce of cocoons in Lombardy, before the disease, was calculated on an average at from 325,285 cwts. to 393,571 cwts. In 1866 the produce may be estimated at 157,440 cwts., of the value of 1,280,000*l.*

Milk, Butter, and Cheese.—Milk, butter, and cheese are among the principal and most important products of these provinces, and especially of the irrigated districts of Lower Lombardy. It is calculated that exclusive of an enormous consumption of milk in kind, the manufacture of cheese amounts to 21,632 tons per annum, of a value of 1,200,000*l.* Of the total quantity, the

* The production of wheat is probably not a tenth of this quantity; the figures are misprinted.—H. E.

cheese called "Parmesan" in England, but here known as "Grana," and made in Lower Lombardy only, is calculated as amounting to about 14,760 tons per annum, of a value of from 800,000*l.* to 880,000*l.* A considerable quantity of butter, estimated at about 14,700 tons, of a value of nearly 1,000,000*l.** is also made in Lower Lombardy.

According to the Government Official Report of 1864, the export of cheese from the whole kingdom of Italy amounted only to 3393 tons, of the value of about 160,000*l.*, while the importation of the same article amounted to 4966 tons, of a value of 220,000*l.*

Exports and Imports.—Rice is the only cereal of her own production exported by Lombardy, with the exception of a small quantity of wheat supplied to the neighbouring canton Ticino in Switzerland. The province of Mantua, now united with the kingdom of Italy, also occasionally sends a little wheat, *viâ* Venice, to Trieste.

There is no importation of grain into Lombardy.

Report by Mr. Vice-Consul Gaggiotti, on the Trade and Commerce of Ancona, for the Year 1867.—The crop of wheat has been abundant; Indian corn scarce. Of the récolte of 1865 nothing hardly remained at the commencement of 1866. This year's crop of wheat found buyers, at the beginning of the season, at very moderate prices, say about 40*s.* per quarter; but the prices ascended to 44*s.* per quarter in consequence of Government requiring supplies for the military. Commissions received from England caused the prices to increase to 50*s.* per quarter. In addition to commissions from England, others were received from the Roman Government, thus causing wheat to increase to 65*s.* per quarter, and the price is still stationary.

Indian corn was not sought for. Prices gradually increased to 35*s.* per quarter.

The exportation of grain this year is close upon 8000 quarters.

No exportation of Indian corn has taken place, the small quantity that existed being required for home consumption.

Beans also have been scarce, but the crop has always been limited; the people not making great use of them, and none being exported. The prices for beans have almost always been stationary, say 34*s.* per quarter.

French beans have also been scarce, and the prices were 10 per cent. above those of 1865. The prices realised have been 20 francs the hectolitre (48*s.* the quarter).

VENICE, 1867.—It was considered that the use of sulphur in 1865 had exterminated the vine disease; the following year it was discontinued to save expense, and the destruction of a great part of the grape crop was the result.

The disease which destroys the silk-worm is attributed to local causes; either to the atmosphere or to the mulberry-tree, since the eggs produced from worms of the Japan breed are subject to the disease as well as indigenous eggs.

The Venetian provinces produce wheat and Indian corn, and sometimes export them.

GENOA, 1867.—This district produces little but oil, wine, and vegetables. The manufacture of vermicelli and maccaroni increases very much; great trouble is taken to suit the English taste.

NAPLES, 1867.—The olive crop of Calabria, as elsewhere, is a precarious one; the produce of oil in 1866 was deficient. The silk crop was the worst ever known. The disease began its ravages in 1853, and since that time there has been a yearly diminution of produce. The little silk that is produced is from Japan "seed" (eggs). Besides wheat and maize, madder and liquorice are among the field crops of this part of Italy.

* The estimate of the value of butter may be somewhat high.

SARDINIA. This island exports between 30,000 and 40,000 quarters of wheat each year. Wheat and beans are two of the staple productions. The island has not prospered of late years. The price of labour has risen; thousands of able-bodied youths have been drained off by the war. The crops have been deficient.

SICILY. Reports from Palermo and Messina in 1866 and 1867.—The vine disease has disappeared; sulphuring is still continued. The disease among lemon and orange trees continues its ravages. Large tracts of land have now been planted with young bitter orange-trees, to be afterwards grafted with lemon. The bitter orange has hitherto escaped the disease. In consequence of the almost total failure of the olive crop last year, and the high price of oil, petroleum has been substituted.

The disease continues to clear off the old races of silk-worms. The province of Catania, which had previously escaped, was attacked in 1867. Indigenous races of worms will soon be extinct, and must be replaced by worms of the Japan breed; and the early-vegetating Chinese white mulberry must take the place of the black mulberry. The soil and climate of Sicily are highly favourable, but the peasantry who produce and those who reel or spin the raw silk for export are reduced to a state of misery. The domestic animals are mules, asses, oxen, and a few horses. Meat as dear as in England; flour, 2½*d.* to 3*d.* per lb.; potatoes, 9*s.* per cwt.; milk, 5*d.* per quart; wine, 4*d.* to 6*d.* per quart.

The agriculture of Sicily has recently undergone a great change. Sicily, once called the granary of Rome, is now dependent on foreign countries for corn.

The cultivation of wheat has been almost superseded by that of rice, flax, and cotton.

The yield of wine in 1866 was very abundant, and good table wine sells for about 1*s.* per gallon.

No remedy has yet been discovered to arrest the disease which has committed such ravages among orange and lemon trees. Gardens, which yielded from 80,000 to 100,000 oranges or lemons, do not give more than one-tenth of that figure.

Oranges and lemons form two very important articles of the exports from Messina.

In 1866, the quantity of fruit exported to Europe and America in its green, pickled, or liquid state amounted to 700,000 boxes, 2000 pipes pickled lemons, 2000 pipes raw or concentrated lemon juice, 350,000 lbs. avoirdupois of essence extracted from the peel. 1000 lemons, price 9*s.*, yield 1 lb. avoirdupois of essence, worth 7*s.*, and nine imperial gallons of lemon-juice, worth 6*d.* per gallon. Sixty gallons of raw lemon-juice are required to make ten gallons of concentrated juice.

Silk Culture.—The result of the silk campaign of the year 1866, in Sicily, was conspicuous in the further falling off in the breed of Macedonia worms, which had, from the partial success obtained in some localities during 1865, encouraged rearers to keep eggs from those worms, whilst rearers of other districts purchased eggs from the speculators, who procured them either direct from Macedonia, or from Calabrians, who furnished them with the assurance of their being of direct importation, whilst they had been chiefly reproduced in Calabria, or the north of Italy.

The Japanese cartons were generally more unproductive than was anticipated, and this circumstance is attributed not only to the unsatisfactory condition of a large portion of the supply, but also to the unsuitableness of the leaves of the black mulberry-trees as food for the Levant and Asiatic breeds of silk-worms. The cocoons produced in Sicily were chiefly from indigenous worms, the eggs for which had been procured in Sicily

from some of the high villages on the slopes of Mount Etna, and it was thought that by securing such for this season of 1867 a decent crop of cocoons might be obtained. From practical attempts made, however, at Gazzi to rear some worms from these eggs, there is much cause to doubt the future success of those who purchased cocoons in those villages, at fabulous prices, for the purpose of securing eggs to be produced under their own surveillance.

A retrospective view of the gradual falling off of the silk culture in this island amidst the difficult substitution of other races, is far from offering a fair prospect for the future, and especially so when it is considered that the black mulberry leaf is so little adapted as food for the Japan and China races of worms. The cultivation of the white mulberry-tree may be considered an exceptional one in Sicily, but, as the black mulberry is liable to disease, it is to be hoped it will be replaced by the white, or, still better, by the Chinese, which is easily propagated, does not require grafting, and is soon productive after the cuttings are planted.

SICILY. Report by Mr. Consul Goodwin, *May 20th*, 1862.—The computed area of Sicily (six and a half millions of acres) contains one and a half million of arable land, one and a half million of wastes and pastures, besides one and a half million of vineyards, olive-grounds, orchards, and gardens. The annual crop of corn is estimated at above two millions of quarters, and the produce of the vine at two hundred thousand pipes. The oil crop yields twelve thousand tuns of oil, and the produce of the shumac leaf comes to thirty thousand tuns a year. The net rental of the surface is valued at about 2,750,000*l.* sterling. Population taken at 2,250,000. The agriculturists consist of yeomen and peasants; the former are mostly middle men between the landlord and tenant, the latter are either quit-renters or co-partners with the landlord. The middle-man farms a piece of land, the greater part of which he keeps in hand; the quit-renters hold small patches of ground on heritable leases, renewable for ever. Servants in husbandry are hired by the day, the month, and the year. The day labourer earns about a shilling a day, receiving fourpence in money and eightpence in food. From April until June the labourers work from 4 A.M. until 8 A.M., from 9 A.M. until noon, and from 3 P.M. until sunset. During the harvest months of July and August they work about twelve hours a day, and from September until March about ten. The miners, amounting to thirty thousand men, work six or seven hours a day during 250 days in the year, and earn from 1*s.* 6*d.* to 2*s.* a day. The ordinary wages of coopers, masons, and riggers of vessels, are from 10*l.* to 40*l.* a year.

The provisions of the working classes are wheaten bread of the coarser kind, which costs about a penny a pound; flat beans or onions, which cost about a halfpenny a pound; and olive oil, which costs about 4*s.* a gallon. Unbrandied wine, which costs about 1*s.* 4*d.* a gallon, is too dear for common use. Instead of butchers' meat, the price of which is high, salt fish is largely consumed; and for salt fish itself, the common substitutes, chiefly in towns, are maccaroni and toasted cheese.

To conclude, the King of Italy possesses, in the position of Sicily, the fertility of its soil and the richness of its veins, a permanent source of wealth, which, wisely administered, would not fail to raise Sicily shortly to unexampled prosperity. It rests with Victor Emmanuel to make Sicily the greatest exporter in Southern Europe of raw and prepared produce, by carrying out the already adopted principles of free-trade to their full extent in all branches of industry.

1864.—The progress of the western provinces, those of Palermo, Trapani, and Girgenti, has been checked by local disturbance. Travellers have been stopped and robbed, and horses and cattle, and produce of all kinds, have been carried off by liberated convicts and fugitives from the conscription.

Money has been extorted from landlords by threats of assassination, carriers have been robbed of their packages, and farmers have been plundered of their corn.

Greece

Imports cereals, provisions, and sheep, and exports wines, fruits, sponges, &c. The port of ingress and egress for the trade of Greece is the Piræus of Athens Population, 60,000. Employment stimulated by the presence of the ships of war of most nations.

THESSALY.—A drought lasted from June till December, 1863. Autumn produce (viz., grapes and cotton, maize, tobacco, and olive oil) were injured by the prevalence, for several successive days in the second week in August, of a violent scorching wind not unfrequent in Thessaly, called the "leevah," somewhat resembling the desert "see-moon." It was followed by a six weeks' drought. The vintage and picking of cotton commenced at the close of September. Scarcely had a fourth of either been gathered when heavy rains set in, and the mountain torrents and floods swept away large tracts of produce in every district. Brigandage and locusts are again rife.

The Ionian Islands, and the Island of Zante, all import corn and flour in proportion to the number of their population. The Island of Cephalonia imports about 45,000 quarters of wheat yearly from Russia and Austria. The products of these islands are currants and olive oil.

Exports of currants from Cephalonia and Morea in 1866, 11,998 tons. Olive oil was once the staple product of the island, but whole groves of olives have been rooted up to make way for vineyards, a sacrifice which the proprietors now regret. The crops of grain in 1866, were considerably under an average, owing to drought in early spring; they barely furnished three months' supply for the population. This is the grain depôt for the supply of the other islands and of the opposite continent of Greece, extending along the western seaboard from the Gulf of Patras to Cape Matapan.

ALGERIA. Reports by Consul Churchill from 1857 to 1863.—Algeria has ever been noted for its grain-producing qualities. The productiveness in cereals in the northern shores of Africa was not unknown to the Romans; but, while other countries which did not formerly enjoy any agricultural repute have progressed by scientific appliances, Algeria has remained stationary.

In 1862, 5,139,136 acres of land were under cultivation in Algeria, of which 8 per cent. was cultivated by the European colonists and 92 per cent. by the natives. The total amount of cereals produced in that year was 4,159,712 imperial quarters, and of this vast quantity of grain produced, only 82,448 imperial quarters, or 2 per cent., were exported. It must, however, be remembered that the colonists go into skilled labour and scientific agriculture to a greater extent than the natives, and produce other articles of trade besides cereals, whereas the Arabs confine themselves more particularly to the production of grain.

M. Forcade de la Roquette, in his valuable Report to the French Government in 1863, observes that the cereals in Algeria are destined to play a great part in the fortunes of this colony, and this may be very true, yet the proportion of exports of cereals, compared with the quantities produced, is so very small, that many years must pass before this prediction will be realised. The fact of the matter is that the expenses incurred in transporting the produce of the country to the sea coast are, under present circumstances, so heavy, that large quantities cannot be brought down. Very good roads have been made by the French, but there is not enough of them to enable the grain produced by the Arabs in the interior to be exported; grain cannot bear land transport beyond a certain

radius, and Algeria does not possess the advantage of river communication. It will naturally be asked, what then becomes of the surplus of grain produced? The answer is that the population of Algeria is 3,000,000 souls, with large numbers of horses to feed, and what is not consumed one year is hidden under ground for another.

Soft wheat was introduced into the country after the French conquest, and even unto this day is rarely produced in the province of Constantine, as it requires more attentive cultivation than hard wheat, which has always been the favourite produce of the natives, because it is grown with comparatively little exertion.

The hard wheat of Bone and Guelma, in the province of Constantine, is much esteemed in Europe for the manufacture of paste, and it is of as good a quality as the best wheat of Taganrog and Sicily.

Rye holds but a very inferior position in the agricultural productions of Algeria.

Barley, of which the best is grown in the province of Oran, has of late been in great demand in Europe, and more particularly in England for brewing purposes.

Algerian oats are in great demand at Marseilles, though their production is not very extensive.

Indian corn is grown as well on the confines of the Sahara as in the Tell.

Wool is one of the most important articles of Algerian produce, and with a little more attention on the part of the Government to put a stop to fraud, this article might in a few years become of much greater importance. Unfortunately the malpractices of the Arabs, who produce, and of the Jews and French who traffic in this article, have much reduced its quality, and the consequence is that it is not now in very great demand in the European markets.

In the provinces of Algeria, the aggregate number of sheep for the year 1863 may be set down at 1,800,000.

The Algerian breed of sheep is in general strong and healthy, and appears to be better adapted to the peculiar nature of the climate than the merinos, or even a cross between the two.

1865.—12,588 cattle, and 156,860 sheep exported to South of France, and some to Spain. 2,634,376 lbs. of tobacco exported.

Three Algerian cattle go to one good-sized English bullock. They cannot come to England, since three months' feeding would be needed to recover the loss of flesh during the voyage, but they will feed the markets of Southern France and cause a current towards the North when the supply is short.

A decrease of 97,605 quarters of wheat, and 168,385 of barley, compared to 1864, owing to failure of the crops.

A flight of locusts from the South has damaged the standing crops this year; their depredations will only be thoroughly felt when the eggs they have laid over the country come to maturity. In some localities where this has taken place the country is covered with a thick black coating, 3 or 4 inches thick, of a living mass of locusts no bigger than flies, and nothing escapes their voracity. The waters have been contaminated with their remains; the air is foul with the smell of the decomposed animals, arising from the hundreds of thousands that are daily being killed. It is impossible to foretell what the consequences of this visitation may be, but it is feared that next year's crop will not be spared by these insects.

Report by Consul-General Lieut.-Colonel Playfair on British Colonisation and Famine in Algeria.—There are four distinct tenures under which land is held in Algeria—

I. *Beytick*, the undoubted property of the State at the time of the conquest.
II. *Azel*, belonging also to the State, but let to natives from a more or less remote period.
III. *Melk*, or freehold, possessed by private persons with regular titles.
IV. *Arch* or *Sabega*, land not subdivided into small holdings, and over which the natives have a claim, not very well defined and frequently contestible.

To the last category belongs "La Safia," which three years ago was a magnificent forest of cork oak, interspersed with rich valleys more or less cleared for cultivation.

A concession of this forest was originally given to a French gentleman for a period of forty years, subsequently extended to ninety years. In terms of this he was to enjoy the right of stripping the cork trees over the whole extent; and of cultivation and pasturage over about 225 acres of cleared land. From the latter portion the Arab occupants were ejected, much against their inclination, though not, I presume, without some sort of compensation. Subsequently, the right of pasturage over the whole forest was assumed by the *concessionnaire*, the claims of the Arabs were ignored, and they were only permitted to pasture their flocks within the forest on payment of rent to the *concessionnaire*.

Such was the state of things when, in 1865, this concession was purchased by the London and Lisbon Cork Wood Company for the sum of 12,000*l*.

What I have described as having taken place at La Safia was going on all around; everywhere the original *concessionnaires* were parting with the land which had been freely given to them as an inducement to colonisation. Their successors were arrogating rights to which they had no legal claim, and a feeling of jealousy and distrust was engendered amongst the native population, which found an expression sometimes in open rebellion, but more frequently in acts of wanton destruction.

This last was the case in the district around La Safia. Three months after the English Company had taken possession, the forests were set on fire in twenty different places, and for two days the flames raged with incredible fury. Seventy miles length of cork forests were burnt; property to the amount of 3,000,000*l*. was destroyed; and in the forest of La Safia alone, 600,000 noble oaks, four-fifths of the total quantity, were consumed.

The attempt to create a trade between Algeria and England in cork, which promised great success, has therefore proved a failure; but the result may eventually prove advantageous to the colony, and to the company as well.

The Government will probably grant the forest to the company as *Melk*, or freehold property, reserving one-tenth as compensation to the Arabs for any rights they may have possessed in it. The rest will be let or sold by the company to colonists, English if possible, and thus it is hoped a small agricultural colony of English settlers may be formed. One English gentleman has already purchased the 225 acres of cleared land. I spent two days at his farm, and was favourably impressed with the richness of the soil and the excellence of the pasture. He speaks in the most confident manner of his prospects of success, and thinks that any competent person coming to this colony with from 2000*l*. to 4000*l*. of capital could, by stock-farming alone, double it in three years.

He has not yet had time to judge of the result of breeding cattle, but he states that he usually purchases lean beasts at the Arab markets for 65 francs each, and that after four months he finds a ready sale for them at 80 francs.

Unmanured land yields 30 and manured land 50 quintals of hay per hectare. This is now selling at eight francs per quintal, though in ordinary

years it would not fetch more than half that sum. Still grass land with very little cultivation will yield 4*l.* per acre, but little more than one year's purchase of the uncleared estate.

I visited the farms of the only two other English colonists in the province, and they assured me that they were doing well; and in their opinion the prospects of English colonisation, at all events as far as regards the breeding of cattle, were most promising.

The Government of Algeria is most anxious, by every means in its power, to induce English to settle in this country; and it is even rumoured that it contemplated recurring to the system of granting free concessions.

Morocco.

Report by Mr. Consul Wooldridge for 1864.—The harvest has been by no means so good as in former years, owing, first, to the unusual dryness of the season during the winter of 1863-64; and, secondly, to the almost complete abandonment, since the revolt of 1863, of the Medivona districts by its inhabitants, who are almost the only agriculturists of the provinces of Dar-el-baida. From the time the subjection of these tribes was enforced by their Kaid, they have almost all deserted their lands and established themselves in other parts of the empire. For these reasons a very small quantity of either wheat, barley, beans, or peas, has been produced. Maize, however, which was sown later in the season, and escaped the dry weather, has been more abundant.

Owing to the long-continued drought which prevailed in the early part of the year, there was, as I have already stated, a great deficiency in the various crops of cereals and pulses.

Servia.

Large numbers of hogs are exported from Servia to Austria and Turkey; they are fed partly on maize, but their chief dependence is on the acorns of the Servian forests; and since the wanton devastation of the forests the pig trade is less productive. Gallicia is becoming the rival of Servia in this trade. Poultry ought to be plentiful, but instead of being reared they are allowed to help themselves to what they can pick up, with the pig for a competitor. The peasants are too lazy to collect the eggs, six of which are worth the value of a fowl. Land is of little value; labour and capital are wanting; the people are degraded and satisfied with the bare means of subsistence. Servia and all the provinces north of the Balkans and the mountains of Upper Albania have an extremely variable climate, with intermittant cold and rain in autumn. The people get drunk on a spirit distilled from plums.

Mining resources in iron, copper, and lead, are considerable.

Population has decreased: it is estimated at 1,086,841, of which 1,000,000 is rural.

Every peasant has a full-grown oak-tree assigned him for a coffin.

The comparative state of agriculture in any part or province of the Ottoman Empire may be pretty accurately determined by the proportion which the cultivation of maize holds to that of corn in general—of wheat, barley, oats, and rye. Maize is extensively grown in Bosnia, still more so in Albania and the Herzegovina, and most of all in Servia, where it forms the almost exclusive article of the people's food. In the other provinces of European Turkey, the better sort of cereals above mentioned, as also rice and linseed, form, both for home consumption and exportation, the chief products, maize being generally superadded, for the support of the poorer class of labourers; the Mussulman population produce and consume wheat and rye, which they for the most part prefer to maize. The reason why maize is the food preferred here is, that it

costs little labour in the culture and less trouble in the harvesting and dressing; it in this respect suits the habits of an indolent race, while the greater risk involved in its production (the crops being slow in ripening and the harvest late) is not much regarded by an improvident people. Such wheat as the country produces is grown chiefly by the Bulgarian settlers in the South; oats and barley are raised for the horses, the first for those of Hungarian, and the latter for those of the Roumelian breed.

There are no artificial meadow grounds; luxuriant tracts of verdure mark the course of the streams percolating the valleys in every direction.

It is a singular peculiarity of the Servian people, that, while thus poorly squatted on the land, they should attach so much value to it in the shape of property. Though more than two-thirds of it are known to be uncultivated there is not a road but is subject to ownership of some sort, and that is not more carefully enclosed and fenced off than the most productive fields of the richest country in Europe. Perhaps more money is spent every year in litigation about the land than the land itself is worth. This must, I believe, be always the case where people appropriate more of the soil than they can or will cultivate, and the evil is here aggravated by deficiency in title.

The quantity of grain imported into Servia, though limited, is, one year with another, much greater than that which is exported. In the year 1863, it is true, a scarcity, superinducing famine prices in the Banat and other Austrian provinces, caused a clearance to be made of all the stocks in granary here, but this can hardly be accepted as a proof of Servia having attained the status of a corn-producing country.

Bosnia.

Report by Mr. Consul Holmes for 1864.—I am happy to report that the cattle murrain has at last ceased. The loss caused to the province, however, will be felt for many years to come.

During all last year the making of roads was continued, but the works were much impeded by the wet unfavourable weather. In the month of February, this year, an immense quantity of rain and snow fell all over Bosnia, and the consequent inundations from the rapid rising of some of the large rivers have destroyed in many places the roads which had been made. The Pasha promises to make great efforts this year to complete all the principal roads he has undertaken, as he is persuaded that they will prove of the greatest importance to the future welfare of the province in every respect.

1867.—Plum crop abundant, and saved the people from the misery which would have resulted from the almost total failure of the hay crop; cereals less than an average crop, and prices doubled during the latter half of 1867. The winter was extremely long, beginning early in November and not terminating until almost the end of April. In the beginning of April not a blade of grass or a leaf was to be seen; and, as in many parts of the country no hay was left, the cattle were reduced to eat the bark of trees, and a great mortality ensued among them. Many animals that were examined were found to have died from having eaten pieces of branches which had pierced the intestines. The animals which survived were too weak to work.

The construction of roads has been recommenced with vigour.

ALBANIA, 1863.—The lateness of the spring rains last year, though productive of loss to the general interests of agriculture, contributed to the abundance of mulberry foliage and to the succulence of the leaf. The silkworm thrives accordingly; and the breeding process having been finished, and the cocoon formed before the sultry weather set in, the gathering throughout the country was most successful.

This country was last year visited with a drought of unusual duration. The

grain crops of every kind were in consequence nearly one-half short of the average. The olives, which promised well in the spring, did not yield more than a third of ordinary bearing years. Hay and straw were scarce, and dear in proportion, and the pastures were so parched that both sheep and cattle suffered much, and the mortality amongst them was very severe.

In the matter of grain, the produce of 1863 having been insufficient for home consumption, large quantities of Indian corn from Italy, and wheat from Thessaly, were imported at prices considerably in advance of the preceding year.

Ragusa.

1863-4.—The cattle murrain, so great a scourge to the husbandman in 1862, appears to have ceased on this side of the Adriatic.

A trade with Great Britain expected. Several roads in course of progress, by the Austrian and Turkish Governments, to the interior—that to Trabique will open up a fertile country, which till recently had been in a state of insurrection and infested by brigands.

If the splendid ports of the Dalmatian coast were free ports, with railway connexion with the Save, not only would the trade with Hungary be opened, but the hidden treasures of Bosnia and the other intermediate provinces would be disinterred.

This is marked out by nature as the commercial gate of the north-west corner of Turkey in Europe and of Southern Hungary.

1865.—The drought of 1865 caused a general failure of agricultural productions, with the exception of wine. There would have been a famine among all the agricultural population, not only of Dalmatia, but of Herzegovina and Montenegro, if it had not been that the very mild winter has been productive of an abundance of green vegetables.

EPIRUS. Janina, 1867.—A supply of wheat is usually obtained from Thessaly, but the harvest in that province in 1866 was destroyed by a plague of marmots! Epirus cotton is classed in the Trieste market with that of Livadia, in Greece; the lands of Lamari, near the sea, offer every facility for the cultivation of cotton on a large scale, but the villagers complain that the cultivation of the land, hitherto in grass, interferes with an old prescription which gives them the use of the pastures, free of charge, in September, every year. Tobacco, wine, and silk, are all grown: on a small scale of course. The olives are of two kinds. All olives yield oil, but there is a special kind which alone is good for eating. The cultivation of this kind, in Epirus, is confined to a few districts. The olives intended for pickling are beaten from the branches before they are ripe, in the month of November. Those that are destined for oil are left to ripen on the tree and to fall of their own accord when mature in January.

Indian corn is the staple grain; it is liable to failure unless on irrigated land. It is ready to cut a month or six weeks earlier under irrigation. The farmers are poor and borrow money at 30 per cent. Prices of beef 2*d.* per lb.; mutton $2\frac{3}{4}d.$; fine flour, $1\frac{3}{4}d.$ per lb.

Cyprus.

Report by Consuls Long and White.—The agricultural capabilities of Cyprus are very great, the soil being rich and fertile, and capable of producing great varieties of crops; yet, from a want of capital, a large amount of good land lies waste, and the price of land, except in some particular spot, such as madder lands at Famagousta, and cotton lands near the chief towns, is very small.

Scarcely one-fifteenth of the arable land is under cultivation, and in addition to this large amount of unproducing soil, it must be added that that portion of the ground which is under cultivation does not produce one-half of its capacity. At one time the island supported a population of two millions of inhabitants, and was also at the same time a large exporter of grain. It is startling to observe that last year the island was obliged to import largely to support a population of only two hundred thousands.

The chief products of the island are wheat, barley, cotton, silk, linseed, sesame, madder-roots, and grapes.

The wheat produced in the island is a small-grained hard wheat, with many of the qualities of the Russian wheats, but brought to market largely mixed with earth and other extraneous substances, which depreciate it in the British market.

The barley is much superior to that of Egypt.

The price of land in the island depends greatly upon its proximity to a town. Good cotton land, near Larnaca, commands from 9*s.* to 25*s.* per acre of rental; but in the interior, where the finest lands are to be got, the rental varies from 3*s.* to 10*s.* The cost of cultivation, including manure, amounts to about 2*l.* 10*s.* per acre; and if the calculation be made, those figures will show apparently fabulous returns.

Madder-roots.—This root is one of considerable importance in British trade; it is a cultivation of great nicety and profit to the agriculturist. The three chief places of cultivation are Famagousta, Morfa, and Trene. The finest quality of root comes from the two latter, and in France they are esteemed above Smyrna roots. At Famagousta, an acre of madder-root land sometimes obtains the high price of 60*l.*, while at Morfa and Trene, solely from their interior situation and want of population, land which produces a finer root commands only from 8*l.* to 10*l.* per acre.

The population of the island in ancient times was 2,000,000; at present it is 200,000, of whom more than two-thirds are Greeks, and the remainder Turks. The yearly increase of the population is not much, and entirely confined to the Greeks. When it is said that the population represents one soul to every fifteen acres of arable land, the great depopulation of the island will be sadly apparent.

The country is level, and transport easy.

The rivers of Cyprus are mostly mere mountain torrents, whose beds are dry in summer: none of them are navigable. In summer they exhibit only dry and stony beds; after the spring and winter rains they rush with violence down the sides of the mountains, carrying with them and depositing on the plains, which they inundate below, a rich alluvial earth, which fattens the soil, and to much of which its fertility is due.

The pine is almost the only tree useful for construction that grows in any quantity in Cyprus. Extensive pine forests exist in the higher mountains, especially in Troodos; some of the trees are of considerable size, but there are no roads by which large timber may be transported to the shore. The forests are wantonly thinned by the peasants, who frequently fire them. There is no kind of provision for the preservation of the forests, a circumstance which is very much to be regretted, owing to the great scarcity of trees generally in the island. Cyprus is known to have been well wooded in ancient times, when it was probably more healthy and productive than at present. The want of trees is very much felt, and the dryness and aridity of the soil are doubtless owing to the great lack of trees, whose presence would be invaluable as a means of attracting rains to the earth.

The Cyproits are of a quiet and inoffensive disposition; they are sociable and hospitable, and remarkably fond of pleasure; but they are naturally lazy and given to idleness. They waste much of their time in their cafés, and are great frequenters of the fairs, which are held at short intervals in different

parts of the island. They are frugal and temperate in their living; coarse bread, cheese, olives, and vegetables, forming the ordinary food of the peasantry; yet, owing to the abundance and cheapness of wine, inebriety is not uncommon amongst them. Brigandage, burglaries, and assassinations are so rare as to be almost unknown in Cyprus. Political agitation, or opposition on the part of the people to the constituted authority, is equally unknown.

The worst enemy, however, among the animal creation which Cyprus has to contend with, and the most injurious to its agricultural prosperity, is the locust. Notices are found in writers of the fifteenth century of the fearful depredations of this insect. It has been imagined that it has been at different times borne by the winds from Caramania or Syria, and thus carried across the sea to Cyprus; it has been again thought that it may have been introduced by ships bringing cargoes of grain. It seems, however, to be indigenous; and so wonderfully prolific is it, that unless active measures are taken to extirpate it, it increases in a few years so rapidly, and in such quantities, as to swarm in myriads upon the face of the country to which they are confined and shut in by the sea. When the wind, however, is strong from the land at the time they approach the coast in their flight, they are carried out to sea, and perish in vast quantities. In the month of April the country is alive with locusts; they eat up every green thing, and leave literally a desert behind them. In August they deposit their eggs and shortly after die. The spots where the eggs are deposited are easily discovered by a shiny viscous matter with which they cover and soften the earth when about to deposit them. The male is said to be much more numerous than the female. Each female is said to lay two or even three eggs, each of which produces on an average at least thirty locusts, the egg being in fact an agglomeration of small eggs in one oblong mass about the size of a fine seed, in which the eggs are disposed close together like seed in a pod. With care and perseverance Cyprus might be freed of this plague. By a systematic and continued destruction of the insect and its eggs it would almost disappear in the course of three or four years. The attempt was made by Osman Pasha in 1855-56, and proved very successful, but it was subsequently neglected, and the consequence was that, although Cyprus enjoyed a few years' freedom from them, yet they gradually increased in numbers till, in 1861, the spring crops suffered fearfully from their ravages.

1867.—The growing of cotton continues in spite of the fall in price. Four-fifths of the seed sown is indigenous; the larger and more enterprising farmers alone sow American seed. Grain is exported to Syria. Locust-beans, or carobs, were formerly in demand in England, but that demand has ceased, and the produce of the island is mainly sent to Russia. The madder root, another important staple production of Cyprus, is also less in demand than formerly, and the price of this dye is diminishing. It is supplanted by cotton.

A large collection of locusts' eggs in 1864, and the unusual wetness of the spring of 1865, saved the island from their ravages. Afterwards the scarcity of locusts caused the people to neglect the search for their eggs during August and September, a neglect attended by the usual results.

RHODES.

REPORT BY CONSUL CALLANDRER FOR 1862.—Agriculture is in a most backward state, being carried on in a most primitive manner and with the rudest implements.

The almost entire destruction of the forests by fire has been a severe blow to the fertility of the island. The soil is no longer manured or kept moist by the fallen leaves, whilst the rain, finding no obstacle from the roots of the trees, makes deep furrows, carrying away the soil and disfiguring the face of the country.

The few remaining woods ought to be looked after in some way or other, and the trees properly felled instead of their being burned down as they continually are. If no efficient measures are adopted to prevent this havoc Rhodes will become an arid rock like the surrounding smaller islands, which were formerly, it would seem, well wooded and watered. This island is still capable of producing, as in former times, cereals, fine fruits, vegetables, and other articles of prime necessity, in abundance; but everything is neglected, the inhabitants being content to raise just sufficient for their wants.

EGYPT.

REPORT BY MR. CONSUL STANLEY ON THE TRADE AND COMMERCE OF THE PORT OF ALEXANDRIA FOR THE YEAR 1866.—The development of the railways and the introduction of steam power for irrigation, cotton-gins, and pressure, have added largely to the coal required for the country; and the wealth of the people, consequent on the profits derived from the cultivation of cotton, has largely contributed to the general use of British manufactured goods amongst the rural population.

In 1862 cotton was first planted, to the almost total exclusion of cereals.

Agriculture.—The present condition of the agricultural industry of Egypt has been so entirely diverted from the rotation of crops in its normal state that any person now going through the country to take a view of the produce of the soil would be altogether misled. The enormous profits which were realised by the growth of cotton during the American war have caused this. When the Cotton Supply Association sent out their Secretary, with Dr. Forbes, to India, those gentlemen were bearers of a memorial to the late Viceroy Said Pasha, praying his Highness to use every possible effort to encourage the cultivation of cotton. The reply was characteristic, and evinced a correct impression and almost a prophetic dread of the revolution that would be produced by an immoderately enhanced price for cotton. He said, " Prices alone will prove a sufficient stimulus without any effort on my part; but God forbid that I should ever see the abandonment of the ordinary succession of crops for the production of cotton, to the exclusion of those products on which we subsist."

Within a short period from that time Egypt, which had ever been a large exporter of grain, beans, &c., had to seek food from other countries, and became an extensive importer.

Grain was considerably dearer in the interior than at Alexandria; in some places absolute famine ensued.

An undesirable change was wrought, the recovery from which will be as slow as its accomplishment was rapid.

The value of land was quadrupled; wages rose in an equal ratio; labourers earned so easily sufficient for their wants that they became indolent; an excessive luxury sprang up, and that not of a nature to benefit the commercial world, being displayed in a demand for white slave girls, costly pipes, and other such appliances, which do not much benefit the industrious world without. Meanwhile the land, from the constant crops of cotton in succession, has become impoverished.

Cotton, however, has long been, and must continue to be, the most important production of Egypt. It is sown in March or April, and arrives at maturity in August or September. An average yield in good summers is 300 lbs. to the acre; the New Orleans variety has been found to yield 800 lbs. per acre; but it is found unmarketable, and is therefore little cultivated.

To show the different products of Egypt, and the average amount of each, I give a statement of the way a large farm of the late El Hami Pasha was divided eight years ago.

It consisted of 39,368 acres, of which 13,344 were let. The remainder was thus sown :—

Produce.	Acres.
Bersim (clover)	2,940
Beans	5,325
Barley	2,564
Cotton	6,904
Sundries	44
Helba (very small beans)	1,220
Flax	440
Lentils	80
Sugar Cane	69
Onions	88
Gardens	232
Chick Peas	254
	26,024*

Cotton seed has also become an important source of profit. In 1858 the ardeb of 270 lbs. sold for 25 tarif piastres; now it sells from 65 piastres to 75 piastres. Formerly it was not of sufficient value to justify its being sent to Alexandria, and it was used as fuel. Now it is all shipped to Europe, and from it is pressed an excellent oil, and from the refuse a cake is made which is said to be more nutritious than linseed cake.

The cattle murrain, which commenced in Egypt before it proved so severe a scourge in England, destroyed, in the first year, 800,000 head of horned cattle. In Lower Egypt almost every animal was destroyed, and it will take years to restore the number of animals.

Population and Industries.—Any estimate of the population of Egypt must be merely approximative. The last census was taken in 1846 by order of Mohammed Ali and the returns showed a population of 4,463,244 distributed thus: Lower Egypt (the Delta) 2,779,667, Middle Egypt 519,582, and Upper Egypt 1,163,995. Since then, to the end of May, 1866, thirteen years showed an excess of births over deaths of 482,219, and six years an excess of deaths over births of 96,935. In 1848, when cholera raged here fearfully, the excess of deaths over births was 65,493. Thus, since 1846, the excess of births over deaths has been 385,284, which, added to the census taken that year, give a total population, in May, 1866, of 4,848,528. In 1865, the deaths from cholera alone are reported officially by the Board of Health to have reached the number of 61,192.

There are few manufactures in the country. The principal are the white coarse cotton clothing used by the soldiers; the blue stuff made of cotton and wool, worn by the present women; silver and gold work, and dyeing English cotton goods. The mass of the people are engaged on the soil. Fishing gives occupation to a great number, amongst whom are many Maltese, Greeks, and Italians. An enormous number of the natives are employed in making railways and canals, and the large towns of Alexandria and Cairo, with their European population, of course give employment to many.

It is estimated that there are 100,000 native servants amongst the Europeans. Donkey boys and dragomans swarm, and though the English are in a minority here, these classes speak English and rarely any other foreign language, except a little Italian.

Public Works.—Railways and canals are being pushed forward with much vigour. In addition to the main lines from Alexandria to Cairo and Suez,

* The total is incorrect; wheat is probably one of the crops unfortunately omitted in the list.—H. E.

various branches have been made in the interior to the large towns of Zagazig, Mehallat-el-Kebir, Mansurah, and very shortly the latter line will be completed northwards to Damietta. A new line is also making to Suez. It will leave the main line at Benba, 30 miles from Cairo, will pass through Balbies and Zazazig, and follow the fresh-water line to Suez. It will not be shorter than the present line, but will go through a more productive country (the valley of Goshen), and will cost little in making and maintaining in repair. The present line through the desert entails enormous wear and tear on the material from the numerous curves and steep inclines, besides the expense of carrying all the water required. In a distance of 45 miles it rises 900 feet. The Viceroy is also constructing a line southward from Cairo. It is finished as far as Benisonef, 70 miles, and will shortly be opened to Minieh, 120 miles. It is said to be the intention of the Viceroy to carry it to Keneh, near Thebes, from whence to Cossier, a port on the Red Sea, it is 90 miles. To extend the line eventually to the ancient Berenin, and make it the port for mail steamers is also said to be a plan of the Viceroy's.

The telegraph is in operation to all the towns, and almost every village of importance in Lower Egypt. It is opened as far south as Assonan, and is being continued under the superintendence of Mr. Hartley Gisborne to Khartoum. In many districts, especially about latitude 20°, it has been found necessary to have iron posts, the white ants destroying wooden ones in a few hours.

Turkey.

GALLIPOLI. Report by Mr. Consul Whitaker for 1861.—The quantity of barley in this neighbourhood is very considerable, but it is chiefly exported by way of Rodosto and Enos, or some other port in the Gulf of Saros. That grown towards the south is the best, weighing from 46 lbs. to 47½ lbs. per bushel, while that produced further north is seldom over 43 lbs. to 43½ lbs. per bushel. It is less esteemed in the English market than the Anatolia barley, but it is quite equal to that of the Danube.

Indian corn forms an important item of local produce, and is popular also as an article of food among the peasants. The produce of the villages of the Peninsula is all that is exported by way of Gallipoli; that grown in other districts is shipped by way of Enos or Lagos. The quality is in all respects equal to Danube grain, and commands the same price in the English markets.

Rye is grown by the peasants for their own consumption; they mix it with Indian corn, and thus make a nutritious but very black bread.

The quality of oats is very inferior.

Wheat is in great favour with the agriculturists of this province, and several varieties were produced, most of which are well known in the British markets.

The bulk of the wheat grown in the northern district is of the same quality as that known as "Baljik wheat," only that the hard and soft varieties are for the most part mixed. Further south the grain improves in quality, and in the neighbourhood of Balair and over the Peninsula it is very fine. It is worthy to be mentioned that all the vegetable products of the Peninsula, or Thracian Cherson, are of remarkably fine growth, exhibiting a marked superiority over the produce further inland.

The wheat of the southern districts of the province gives a weight of 62 lbs. to 63 lbs. per bushel, and it is only far towards the north that it sometimes falls short of the standard weight (60 lbs. per bushel).

If there were a good carriageable road or railroad between Gallipoli and Adrianople, the quantity of grain in excess of local wants which would be carried to Gallipoli for shipment would be little short of half a million of quarters.

Annis-seed.—The quality grown here is inferior to the Mediterranean seed, but superior to that of Anatolia. The strength is good, but the chief defect is in the colour, which is less bright than that of Sicily. This is attributable to the early autumn rains. This seed is worth, on an average, 28*s.* per cwt. in the London markets.

Canary-seed is a crop increasingly in favour with the peasants.

The peasants are lamentably careless in neglecting to weed their land, and in allowing the seeds of weeds to get mixed with the grain sent to market.

Linseed is grown superior to that of Russia and the Danube provinces.

DIARBEKR AND KURDISTAN. REPORT BY MR. CONSUL TAYLOR FOR 1863.—The area, including part of the fertile plains of Mesopotamia, is 19,000 square miles.

The capital (Diarbekr) is situated at a point on the Tigris where the river first becomes navigable to Bagdad and the Persian Gulf. It is also the centre of the great roads that run north, south, east and west, throughout Turkey, and is the meeting-point for caravans from Bagdad, Aleppo, Erzeroum, and Samsoun. This splendid site marks it as a great commercial emporium, and such in fact it has been since the time when under the auspices of Constantine it rose from the status of a village to that of an important military and trading station.

It has been repeatedly plundered by Persians, Arabs, Seljooks, Tartars, Soofees, and Turks, and has always appeared to furnish a rich booty to the captors.

In the last 30 years its commerce, as well as that of Aleppo and Bagdad, has greatly declined, notwithstanding the greater security enjoyed under the present Government compared with the state of anarchy and despotism which prevailed under the Kurdish Beys and Pashas of a former period.

Mohair goats are confined to the districts about Jezireh; the texture of the mohair is not so silky as that of Angora, and its staple is shorter. Crossing with merinos would be attended with success. Sheep cost 5*s.* 6*d.* in their native pastures; 13*s.* at Aleppo and Damascus; Camels, 4*l.* 10s., and 6*l.* to 8*l.* The fleeces weigh about $2\frac{1}{2}$ lbs.; and since 1859 the price has risen from $10\frac{3}{4}d.$ a fleece to 1*s.* $9\frac{3}{4}d.$ Including the wool produced by the sheep bred by the Koords in the mountains, which is inferior, the total production is about 900 tons in 1863, compared with 450 tons in 1857.

The tax on produce is taken in kind, and the large landed proprietors, who share the crop with the fellahs, or cultivators, on a kind of metayer system, care little so long as they get their yearly share of produce.

The produce of wheat in the Pashalik, in 1863, is estimated at 214,000 quarters, and the average price is 15*s.* a quarter; barley, 295,000 quarters, at 7*s.* 6*d.* That harvest, however, was a very poor one, owing to severe winter frosts and the ravages of the locusts. The actual price of wheat was 48*s.* a quarter, and much corn was imported from neighbouring provinces.

Population estimated at 600,000.

ALEPPO, 1865.—A company of speculators forced up the price of wheat and barley until it reached an exorbitant price.

Dyeing and the weaving of silk and cotton stuffs are the staple industries. Wool is exported when the Arabs will furnish it.

DAMASCUS, 1865.—Terrible misfortunes have befallen the pashality; the crops have been attacked by locusts, worms, and blight. Cholera has decimated some districts and caused a general panic, and the cattle plague has left many villages without the means of ploughing; added to which, Government has increased taxation, and no one is willing to buy real property, not knowing to what extent it may be taxed next year.

Merchandise from Bagdad to Damascus has to perform a journey of three or four months by way of Mosul, Diarbekr, Aleppo, and Alexandretta, and thence

by sea to Beyrout and by road to Damascus. A direct road, now in contemplation, would reduce the journey to 40 days, or in good weather to 20 days.

Spain.

MALAGA. Report by Mr. Consul Mark for 1863.—The province of Malaga is not a grain-producing district, the consumption being greater than the growth, and grain and flour are imported coastwise.

The fruits peculiar to Malaga, such as raisins, grapes, almonds, figs, oranges, and lemons form the staple produce.

LISBON. Report by Mr. Consul Smith for 1861.—The harvest this year has not produced sufficient grain to supply the wants of the population, and in those years when corn has been exported the quantity has been made up by corn introduced over the Spanish frontier.

The price of wheat having risen considerably during the end of 1861, a Government decree was issued in October permitting the admission of foreign grain for consumption for six months to the end of April. Since then 25 vessels laden with wheat have arrived from America, and 15 vessels from Algiers and the coast of Barbary. The following table shows the average price of grain during the year 1861 :—

	s.	d.		s.	d.	
Wheat	62	8	to	72	10	per imperial quarter.
Indian corn	32	1	,,	35	10	,,
Rye	34	6	,,	37	0	,,
Barley	28	8	,,	33	6	,,

In the province of Alemtejo great quantities of grain of all kinds, and of oil, are produced; but, owing to the scantiness of the population, want of capital, and the miserable state of the roads, a vast proportion of its excellent soil remains uncultivated. The works now in active progress, in the construction of railroads, which are in a forward state of completion, the making new roads of the ordinary kind, and the repairing of those now in existence, must be productive of the most beneficial results, in bringing very extensive tracts of excellent soil under tillage and facilitating the working of several of its numerous mines.

EAST COAST, VALENCIA, BARCELONA, ALICANTE. Reports of the Consuls for 1861.—Rice, wine, oranges, silk, raisins, nuts, locust-beans, and oil, are the principal products of these provinces, in which wheat is scarcely grown in sufficient quantity for consumption.

The profits of the rice crop are inducing its cultivation in the extensive swamps near the mouth of the Ebro. In the raising of rice and the other grain crops under irrigation in this province, nearly 200 tons of guano are annually consumed. On the whole, agriculture may be pronounced in a flourishing condition.

CARTHAGENA.—"The harvest of 1863 was a complete failure, the drought having continued from early in the spring to the end of November." The dry season seems to have cured the vine of its long-standing disease, the grape having seldom turned out more prolific or in better condition. The silk crop again failed through disease in the worm, the olive crop was bad, and as all the necessaries of life were exorbitantly high, great distress prevailed.

Crops in 1864 abundant.

ALICANTE, 1866.—The exportation of esparto grass (*stipa spicata*) at this port has been somewhat less, only about 7000 tons having been shipped, instead of 9000 in 1865. This, however, is owing to the want of cheap freights, which the article requires, as there are considerable stores of it waiting for embarkation.

This plant or weed has long been in use in this country for making common ropes, matting, and baskets. Indeed, every farm-house manufactures all that it requires; and the poorer people prepare it into slender cords, which they furnish to the ropemakers to be converted into cables. Besides this, the town of Crevillente, five leagues distant, has acquired celebrity for its matting and imitation carpets, which are sent to all parts of Spain. There exist at present, in that village, 40 manufactories, which consume upwards of 10,000 tons of esparto, and employ about 4000 hands, including men, women, and children. The number of pieces of matting, from 40 to 50 yards in length, which they prepare, amounts annually to 175,000; and the rate of wages ranges about 10 rials a day for the weavers, 5 for those engaged in sewing, and from 2 to 3½ rials for women and children.*

The grain crops in the greater part of the province of Alicante will this year be almost a total failure, in consequence of the want of rain; and much misery is already observable in the poorer classes, many of whom are emigrating to the interior and Algeria.

NORTHERN AND NORTH-WESTERN COAST, BILBAO, 1861.—Crops of wheat were unusually large in the north of Spain; prices, nevertheless, continued high, owing to the demand in the south. It is a curious fact, founded on long observation on the part of those engaged in the corn trade, that the crops are never good both in the north and the south of Spain in the same year. The southern harvest, which was bad in 1861, enabled the northern farmers to keep up the price.

Some flour was exported to Great Britain and Cuba.

Transit from the interior is difficult. The wealth and simple habits of the Castilian farmers are obstacles to increased agricultural production. Their wheat is of good quality (61 lbs. to 62 lbs. a bushel), and bears storing well. Importation of foreign grain is prohibited, and consequently the growers rule the price, which is as high as in England, and sometimes reaches famine quotations.

1868.—Crops last year moderate. Drought this year unprecedented. The failure of the harvest in the great corn districts of Castile and Arragon is a most serious matter. Under the present miserable system of cultivation in Spain, barely sufficient corn is grown for the wants of the population. After supplying the Spanish colonies, and the effect of a deficient harvest, a rise in prices is quite uncontrollable under the existing tariff.

Temporarily removing the duty on foreign corn is ineffectual, partly through delay, and because prohibition has already fettered trade and discouraged mercantile enterprise. Bread has already risen to 11*d.* the 4lb. loaf, and there is great anxiety for the future. The position of Bilbao and the advantages enjoyed by the Basque provinces combine to direct a large proportion of the foreign commerce of Spain to this port.

REPORT BY MR. CONSUL YOUNG FOR 1863.—The crops in the northern district of Spain were good both in quantity and quality; prices continued high without any material change. Considerable exports of first-quality flour were made to the Havana; neither grain nor flour was exported to foreign ports.

A large influx of strangers has followed improved means of communication; this, combined with the demand for luxuries and a style of living formerly unknown to the simple inhabitants, has of course brought with it a great advance in the prices of everything. Provisions have advanced 50, and house-rent 100 per cent., within a very few years, and Bilbao has quite lost the character it formerly obtained of being a cheap place of residence.

1865.—In grain and flour shipments considerable activity prevailed, large shipments of flour having been made to Cuba and Great Britain, and of wheat to England. If to increased communication the farmers in the corn-growing districts would join certain improvements in their mode of cultivation, and, with

* A *rial* is 2½*d.*

some energy, this important trade would become regular instead of exceptional. Harvest excellent. Total value of wheat and flour exported, 162,000*l.* The ancient system of cultivation, garnering, and holding out for high prices, continues in Castile, a province which, under proper farming, might produce three times the present quantity of corn grown.

SANTANDER. Report by Mr. Vice-Consul Young for 1864.—Little wheat is grown in the province of Santander.

In the Castiles agriculture is still carried on in a very primitive manner, although a few patent English ploughs and reaping-machines have found their way into two or three large farms. A fine growing climate, fertile land, and an aversion to all kinds of innovation, render the small farmers, who for the most part rent the soil, indifferent to the aid of science.

Vigo, 1861.—Corn crops under an average both in quantity and quality. Prices of wheat were, 55*s.* 6*d.* to 61*s.* 9*d.* for the first quarter of the year, rising to 74*s.* to 78*s.* for the last quarter.

Ferrol and Vigo.—The cereal crops of 1863 were an average in quantity but not in quality, the summer having been too hot and dry. The average price of wheat for the year was over 70*s.* a quarter, and that of other grain was proportionately high. Before harvest the price of wheat rose to 90*s.* a quarter. In England the average price of the year was 44*s.* 9*d.*

SAN SEBASTIAN. Report by Mr. Vice-Consul March for 1863.—The staple produce of Guipuzcoa is Indian corn, which forms the chief food of the peasantry. Under favourable auspices it arrives at great perfection in this part of Spain; the stalks, with their amber-coloured heads, or majorcas, and dark green leaves, rising frequently to the height of six or seven feet. The annual produce of this nutritious and economical grain averages 92,625 quarters, valued at 143,000*l.*

Of wheat, about 39,000 quarters are grown yearly, representing a value of 99,500*l.* This quantity is by far too small for the consumption of the province, so that nearly as much again is imported, chiefly from Santander.

Guipuzcoa is a great cider-drinking country, and the quantity annually made from the orchards, in which it abounds, is enormous. The annual quantity of this liquor manufactured in the province is calculated at 1,114,500 gallons, and the value of it at 19,000*l.* (4*d.* a gallon). It was said, after the cholera visitations of 1852 and 1853, that cider drinkers had enjoyed a peculiar immunity from that disease.

MAJORCA.—The island of Majorca produces large quantities of fruit and grain. The country is generally mountainous; but there are some large plains covered with palm, almond, olive, orange, carob-bean, and other fruit-trees. The sides of the mountains are even covered with these trees. The hills, in several instances, rise to a height of 5000 feet above the level of the sea. Agriculture is in a very backward state, the peasant not having the most rudimentary ideas of the art. The climate is good, the heat not being excessive. The high chain of mountains screen the greater part of the island from the north winds. An English Company is at present engaged in draining some large marshes situated on the island, and has already laid out a considerable sum of money on the works. Cotton is their object.

Russia.

Report by Mr. Vice-Consul Edward B. B. Barker, on the Products of the Crimea.—The peculiar climate of the Crimea, very hot and very cold, and the position of the several districts of this peninsula, as they happen to look to the east or west, north or south, renders them fit for the cultivation of any vegetable or fruit which Europe produces; and if rain came more frequently to moisten this most fertile soil, the Crimea would be the most productive

region in the world. But the vicissitudes of successive invasions to which the country has for centuries been subjected, on account of its flat nature, and the want of fortified positions, have denuded it of trees, and as no others have been planted, there is nothing to attract moisture and retain it. The emigration of the Tartar races, and the liberation of the peasantry from serfdom, which have deprived the proprietors of labouring hands, have given the finishing stroke to the well-being of this unfortunate country, and we now see it reduced to the last extremity.

The government have done very wisely in ordering that every district in Russia should, from time to time, bring its products and manufactures to an "Exhibition," for the distances between the farms or hamlets (for there are no large villages) are so great, that it would be impossible for the inhabitants to know what improvements are being made in other parts of this vast extent of country.

Should no future political revolution take place in the Crimea, the German element will one day predominate to the exclusion of all other; for this hard-working, persevering race overcome all difficulties, and manage to thrive where the Russians and even Tartars fail.

Beet-root, from which Russia now obtains its supply of sugar, has become a most important vegetable; the cabbage furnishes the food of two-thirds of the population, in some shape or another, winter and summer.

There is no apparent reason why the Crimea should not produce the finest and most abundant crops of cotton, for the soil is, in general, excellent, and the climate quite as hot, if not hotter, than any part of America. This plant will also succeed very well where it is not watered, as it does in Syria, where no rain falls during the whole summer, so that the want of rain would not be an obstacle. In Cyprus, also, cotton grows very well during the great droughts to which that island is subject. Tobacco grows in the Crimea very well, and why should not cotton?

The same may be said of silk, for the specimens of cocoons and thrown silk were exceedingly good and fine, but the specimens are the results of the experiments of the German colonists; although silkworms have been reared for years in the Crimea, the Tartar emigration has nearly destroyed the cultivation, for the worms were reared by the peasants, who were all Tartars.

The breed of horses is of the small Tartar breed, and not remarkable for anything except their powers of endurance.

ST. PETERSBURGH, 1867.—Freights have ruled as follows:—

Ports and Goods.	May.		June.		July.		Aug.		Sept.		Oct.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
London: Tallow per ton	18	0	..		19	0	21	0	18	0	17	0
" Wheat per qr.	3	0	3	9	3	3	3	9	3	6	3	3
" Oats .. "	2	4	..		2	6	2	3	2	3	2	6

Marine Insurance.—The usual rates of marine insurance at St. Petersburgh are 1 to 6 per cent. in the case of sailing-vessels, and ½ to 3 per cent. in the case of steamers, according to the time of the year, the premiums rising about the month of August.

The shipping season commenced with the breaking up of the ice on the $\frac{\text{21st April}}{\text{3rd May}}$, and closed on the 10 (22) November, having been shorter by two days than in 1865.

The tendency of Russian produce to cheapen is one of the natural consequences of improved communication. Formerly the produce exported from St. Petersburgh had been grown two years previously: thus, the wheat, the hemp, and the tallow of 1860 were only exported in 1862. Now, however, the inland stocks are considerably reduced; and at least half the cereals grown in 1866 will be available for 1867.

TABLE showing the medium ROUBLE PRICE and the corresponding STERLING COST, free on board at CRONSTADT, at the average RATES of EXCHANGE, of the principal ARTICLES of EXPORT from ST. PETERSBURGH between 1857 and 1866.

—	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	Average of Medium Prices. 1857-61.	Average of Medium Prices. 1862-66.
Average rate of exchange pence per rouble	$37\frac{1}{4}$	$35\frac{13}{16}$	$34\frac{15}{16}$	$35\frac{3}{4}$	$34\frac{1}{8}$	$34\frac{9}{16}$	$36\frac{15}{16}$	$32\frac{1}{2}$	$31\frac{1}{2}$	$29\frac{9}{16}$	$35\frac{9}{16}$	33
Linseed, No. 1: per chetvert R.	$11\frac{1}{4}$	$10\frac{1}{2}$	$9\frac{1}{2}$	$10\frac{1}{4}$	$11\frac{1}{2}$	12	$12\frac{1}{4}$	12	$12\frac{1}{2}$	14	$10\frac{1}{2}$	$12\frac{1}{2}$
,, per imp. qr. free on board	2*l.* 13*s.* 6*d.*	2 8 0	2 2 6	2 6 9	2 10 0	2 13 0	2 17 6	2 9 6	2 10 0	2 12 6	2 8 2	1 12 6
Wheat, Saxonka: per chetvert R.	$10\frac{1}{4}$	$9\frac{1}{4}$	$9\frac{1}{4}$	$10\frac{1}{4}$	11	$9\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$11\frac{1}{2}$	10	$9\frac{1}{2}$
,, per imp. qr. free on board	2*l.* 8*s.* 6*d.*	2 2 6	2 1 0	2 6 9	2 8 0	2 2 0	2 0 6	1 15 6	1 18 0	2 3 0	2 5 4	1 19 9
Oats, 6 pds. gross: per chetvert R.	$3\frac{3}{4}$	4	4	4	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{1}{4}$	4	$3\frac{3}{4}$
,, per imp. qr. free on board	0*l.* 19*s.* 3*d.*	0 19 9	0 19 0	0 19 1	0 19 9	1 0 1	0 16 9	0 14 9	0 16 3	0 17 3	0 19 6	0 17 0

NOTE.—*Population.*

European Russia	50,330,752
Caucasian ,, ...	4,257,704
Asiatic ,, ...	4,070,938
Poland	4,800,000
Finland	1,680,000
	65,139,394

Corn Sown and Reaped in Russia in Europe (not including Poland or Finland). Compiled from the Reports of Governors, 1859 and 1863.

Zone	Province.	Sown, Winter Corn.	Sown, Spring Corn.	Reaped. Winter Corn.	Reaped. Spring Corn.	Yield. Winter Corn.	Yield. Spring Corn	Chetverts for each Inhabitant. Winter.	Chetverts for each Inhabitant. Spring.
		Chetverts.*	Chetverts.	Chetverts.	Chetverts.	Fold,	Fold.		
Northern Zone ..	1. Archangel ..	15,740	62,150	65,600	206,000	4·2	3·3	0·22	0·74
	2. Vologda	230,600	474,600	957,000	1,340,000	4·1	2·8	0·98	1·37
	3. Olonets	58,350	86,670	215,400	330,000	3·7	3·8	0·72	1·11
Aláun ,, ..	4. St. Petersburgh	150,500	267,100	503,130	917,000	3·3	3·4	0·42	0·76
	5. Novgorod ..	336,000	742,400	1,150,000	1,929,000	3·4	2·6	1·26	2·12
	6. Tver	652,900	1,317,600	2,917,000	4,042,000	4·4	3·5	1·87	2·60
	7. Tskof	325,000	550,000	1,172,500	1,550,000	3·6	2·8	1·63	2·14
	8. Smolensk ..	931,454	1,143,000	2,450,000	3,400,000	3·3	2·9	2·14	2·99
Baltic ..	9. Esthonia ..	92,300	121,500	455,000	470,000	4·9	3·8	1·41	1·5
	10. Livonia	227,000	326,000	1,313,000	2,100,000	5·7	6·4	1·41	2·26
	11. Courland ..	135,000	162,500	813,000	921,000	6·0	5·6	1·44	1·62
Lower ,, ..	12. Witebsk	270,550	421,500	765,000	1,185,500	2·8	2·8	0·98	1·52
	13. Mohileff ..	346,200	556,000	813,300	1,410,000	2·4	2·5	0·88	1·52
	14. Minsk	490,000	590,000	1,960,000	1,952,000	4·0	3·3	1·94	1·94
	15. Grodno	407,000	294,060	1,400,000	813,500	3·4	2·8	1·56	0·94
	16. Wilna	362,000	406,000	1,075,000	1,115,000	3·0	2·8	1·19	1·23
	17. Kovno	388,400	445,200	1,743,630	1,884,000	4·5	4·2	1·65	1·79
Carpathian ,, ..	18. Kief	680,400	753,100	3,520,000	3,084,200	5·2	4·1	1·74	1·53
	19. Volhynia ..	541,600	624,500	2,060,000	2,090,000	3·8	3·3	1·28	1·30
	20. Podolia	729,500	745,000	3,000,000	2,752,000	4·1	3·6	1·6	1·47
	21. Chernigoff ..	551,000	560,000	2,150,000	1,450,000	3·9	2·5	1·44	0·96
	22. Poltava	805,800	1,100,000	2,980,000	3,660,000	3·7	3·3	1·55	1·91
	23, Kharkoff ..	485,000	865,600	1,561,000	2,820,000	3·2	3·2	0·97	1·77
Steppe ,, ..	24. Kherson ..	355,000	421,000	2,100,000	2,140,000	5·9	5·0	1·58	1·61
	25. Bessarabia ..	236,900	453,400	1,440,500	2,723,800	6·0	6·0	1·40	2·65
	26. Ekaterinaslaf	260,000	650,000	910,000	2,205,000	3·5	3·3	0·80	1·95

* Chetvert = 5·77 bushels.

CORN SOWN AND REAPED IN RUSSIA IN EUROPE—*continued.*

Province.		Sown.		Reaped.		Yield.		Chetverts for each Inhabitant.	
		Winter Corn.	Spring Corn.	Winter Corn.	Spring Corn.	Winter Corn.	Spring Corn.	Winter.	Spring.
		Chetverts.	Chetverts.	Chetverts.	Chetverts.	Fold.	Fold.		
Steppe Zone—*cont.*	27. Taurida	125,000	300,000	423,000	1,600,000	3·3	5·3	0·69	2·63
	28. Don Cossacks	266,500	788,500	1,332,600	3,517,100	5·3	4·4	1·40	3·70
	29. Saratoff	954,000	1,403,000	4,229,000	4,637,000	4·4	3·3	2·58	2·89
	30. Astrakchan ..	32,393	84,000	125,140	310,000	3·8	3·6	0·26	0·64
Central „	31. Yaroslaf ..	390,000	786,000	1,389,000	2,136,000	3·5	2·7	1·43	2·20
	32. Kostroma ..	512,000	984,000	1,646,000	2,284,000	3·2	2·3	1·53	2·12
	33. Nijegorod ..	755,000	1,020,000	3,250,000	4,100,000	4·4	4·0	2·52	3·19
	34. Penza	766,200	1,146,000	3,223,000	4,370,000	4·2	3·8	2·73	3·70
	35. Tamboff ..	993,200	1,471,000	4,226,000	6,003,000	4·2	4·0	2·14	3·00
	36. Veronej	1,085,000	1,745,000	3,800,000	5,250,000	3·5	3·0	1·96	2·70
	37. Kursk	947,000	1,398,000	3,850,000	4,450,000	4·0	3·1	2·12	2·45
	38. Orel	982,130	1,481,600	4,050,000	4,230,000	4·1	2·8	2·61	2·73
	39. Kaluga	403,000	603,000	1,125,400	2,345,000	2·7	3·8	1·16	2·43
	40. Tula	863,900	1,630,000	3,530,000	4,315,000	4·0	2·6	3·06	3·74
	41. Moscow	517,100	831,500	1,385,500	1,950,000	2·6	2·3	0·88	1·24
	42. Vladimir ..	586,600	907,300	2,000,000	2,430,000	3·4	2·6	1·64	2·00
	43. Riazan	708,174	1,176,000	4,330,700	5,164,000	6·1	4·3	3·05	3·64
	44. Simbirsk ..	680,000	880,000	3,301,000	2,763,000	4·8	3·1	2·79	2·33
Ural „	45. Katan	845,900	1,132,500	2,663,200	2,700,000	3·1	2·3	1·65	1·68
	46. Viatka	1,450,480	2,156,800	3,250,000	6,155,000	2·2	2·8	1·46	2·77
	47. Perm	516,000	1,650,000	1,375,400	4,940,000	2·6	3·0	0·64	2·30
	48. Orenburgh .. 49. Ufa	650,000	1,200,000	3,250,000	4,800,000	5·0	4·0	1·76	2·60
	40. Samara	642,200	1,964,400	2,368,000	7,667,000	3·6	3·9	1·41	4·57
	Total	25,535,971	40,871,480	99,613,000	136,606,100	3·9	3·3	1·64	2·25
				236,254,700*				3·89	

* About 161,125,000 quarters.

AMERICA.

BOSTON. MASSACHUSETTS, *October*, 1862.—The large crops of grain of the West and South-West, and surplus of last year, have come forward in larger quantities than ever before known, being diverted from their usual channels by the war. Railways crowded, freights double. Demand for Europe equal to the large receipts here.

Exports to Europe, 1861.

Flour	1,178,000 barrels.
Wheat	2,000,000 quarters.
Maize	600,000 ,,

1862.—The high price of exchange has stimulated the export trade. Railroads connected with the west so fully employed as to have raised the cost of flour, &c., on the sea-board. A great home demand in consequence of the increased activity in manufacturing towns: prices therefore higher. This country has been able to make good the deficient harvest in Europe.

1863.—The drain on the male population for recruitments has enhanced wages and augmented greatly the price of necessities of life. Price of flour higher than in any year since 1856. Agricultural wages have risen from 64*s*. a month to 9*l*. 12*s*. a month. Crop short.

The excitement in the wool market has been beyond all precedent; the increase in woollen machinery is estimated at 30 per cent. in eighteen months.

1864.—Exports of flour to the provinces only 342,000 barrels; of wheat, 6 bushels!

1866.—Boston itself is increasingly a large and very handsome city; but the high prices render it a very costly and onerous residence. Even a very moderate house, if furnished, cannot be rented under 4000 dollars and taxes; unfurnished, 2500 dollars to 3000 dollars; and, even at these prices, there are scarcely any in the market, so that persons of small means are necessarily driven to hotels, where 4 to 5 dollars a day are expected for accommodation, without any extras. Labour commands at least 2½ dollars a day; skilled labour a very much higher rate; so that the money which would give a competence in Europe is absolutely here absorbed by necessities. The cessation of the war has not induced, as was expected, lower prices; but, in many articles, the contrary; and no relief can be looked for as long as there is such a large amount of currency in circulation.

1867.—Has suffered from the unsettled state of finance, the political agitation, and the prohibitory tariff. Stagnation of commerce. Harvest generally moderate; good in the West. Prices high in consequence of the deficient crops in Europe.

Exports to Foreign Ports.

	1866.	1867.
Flour, barrels	178,754	195,109
Wheat, quarters	60	3,000
Maize..	4,628	3,441

CALIFORNIA, 1861.—The agricultural resources of the country have been considerably extended during the past year.

The total yield of wheat has been 680,000 quarters; average yield per acre estimated at 20⅔ bushels.

The number of cattle increased so greatly that the price fell to less than half that of 1860. Several thousand have been boiled down for tallow, netting to the owner about 44*s*. to 48*s*. each.

Growth of wool attracting attention.

1862.—Yield of wheat estimated at 1,115,000 quarters, or nearly 24 bushels an acre; but this the Consul thinks cannot be entirely relied on, though it is the best statistical information that can be obtained from the Surveyor General's Office.

1863.—170,000 quarters of wheat, and 12,000 barrels of flour, shipped to England in 1863; chiefly superior white wheat averaging 64 lbs. per bushel. Cost on board, including freight, 47*s.* 6*d.* for the first seven months, 42*s.* to 44*s.* for the last five months.

Cattle almost unsaleable. Stall-fed, 2*l.* to 7*l.* 10*s.*

1864.—The drought of last winter injured the crop of grain. 60,000 quarters of wheat and 281 barrels of flour were shipped to England early in the year, and 13,000 quarters and 22,000 barrels of flour to Australia. Flour was imported later in the year. .. ..

1865.—Price of wheat before harvest, 90*s.* to 100*s.* per quarter: supplies were received from Chili. After the crop the price receded to 60*s.*, and at the close of the year was 40*s.* to 42*s.* Large exports of 1865 crop to Australia, New Zealand, and China, viz., 86,745 quarters of wheat, 163,700 barrels of flour. Stocks on hand larger than ever before. The price of barley had been 54*s.* to 56*s.* in January; after the new crop it fell to 17*s.* per quarter. There have been exports to New York, Peru, Mexico, and Vancouver Island.

BALTIMORE, 1861.—Connected with Virginia and the interior by the Baltimore and Ohio railway, Baltimore is favourably situated for trade.

Receipts of Grain.

	1858.	1859.	1860.	1861.
	Quarters.	Quarters.	Quarters.	Quarters.
Wheat	340,000	383,000	355,000	330,000
Corn, viz. maize	500,000	450,000	380,000	310,000
	1863.	**1864.**	**1865.**	**1866.**
Wheat	291,000	240,000	235,000	170,000
Corn, viz. maize	275,000	285,000	367,000	550,000

The tobacco planters complain of the scarcity of labourers; they depend almost entirely on coloured hands, to whom they pay 9 dollars to 13 dollars a month with rations. The tobacco lands, as a rule, are very unhealthy. The state is rich, but the grain trade is not very considerable.

Exports of Flour from Baltimore for the last Four Years.

Destination.	1866.	1865.	1864.	1863.
	barrels.	barrels.	barrels.	barrels.
Great Britain	6	3	20,509	39,809
Hanse Towns	16	18	1,242	330
Holland	33	1	2,359	3,817
France	..	..	..	..
Brazil	92,541	120,951	170,594	157,286
River La Plata	..	..	12,286	933
British North American Colonies	16,507	17,249	14,430	33,412
Venezuela	..	..	1,369	..
West Indies	70,070	76,401	98,869	83,473
Other ports	125	851	11,424	7,331
Total	179,298	215,474	333,082	326,391

Trade and Commerce.—The increase in trade at Baltimore during the past year was, in a great measure, owing to the facts that the evil effects of the late war had partly been overcome, and because communication with the South and West having been uninterrupted, the receipts of produce from those sections were greater, while, in return, they took larger supplies of imported goods from here; also because the political sympathies between a large number of the people in Maryland and of those of the South attracted a considerable trade from that quarter; a trade greatly developed by the establishment of steam communication with New Orleans *viâ* Havanna, with Charleston, Savanna, and Wilmington, by which means large quantities of grain and other merchandise were shipped to the South, and cotton, naval stores, &c., received in return. There is good ground to believe that this trade will prove most successful, because as the effects of the abolition of slavery are recovered from, the cost of produce (grain, tobacco, &c.) will be reduced, while, on the other hand, the demand for Southern produce in this market will increase by the growing requirements of manufacturers, and through the increased traffic with Europe by direct steam communication.

Two classes of trade have been seriously affected by the war; that with the British West Indies, diverted during that period to New York, has not been recovered; and that with the continent of Europe, based mainly on the trade in tobacco grown in Maryland, has been greatly contracted in consequence of the reduction in cultivation of tobacco by the change in the labour system.

Wheat.—The crops in Maryland and neighbouring States during the last three years have been but partial, and the harvest of 1866 proved the smallest of these years, obliging millers to have recourse to western spring wheat.

Indian Corn.—The crop of 1865 was the largest known for many years; that of 1866, only gathered late in the year, is generally estimated still larger, and of very fine quality.

Guano.—A heavy increase in imports of this article took place, and it appears probable that still larger quantities will in future be required here. Eleven cargoes have arrived from the Chincha Islands with upwards of 13,000 tons, and 20 cargoes from Navassa with 7000 tons. The Peruvian guano sold at 60 dollars (gold) per ton, and was chiefly taken by the Southern States. The Navassa guano was sold cheaper, and remained in Maryland.

MAINE, 1862.—Not enough wheat or other corn grown for consumption; it is procured from Canada and the Western States.

1863.—The flour which was formerly supplied to this State and its seaboard towns from Boston and New York is now obtained more cheaply from New Hampshire and the British Provinces.

PORTLAND, MAINE. REPORT FOR 1866.—Communication with the West and with the great produce trade of the Lake Cities by the Grand Trunk Railway. The general and extensive export trade at this city has been checked by the high rate of wages and outfits, the enormous expenses at Southern ports, the high rates of insurance, and the cost of building a ship, which is from 50 to 75 per cent. more than before the war, in consequence of the heavy tax paid to the Government in the shape of duty on materials. The lumber trade is very great, and as immense quantities of lumber are required from Canada and the British Provinces to build houses for the rapidly increasing population of the city and State, the Board of Trade of Portland petitioned Congress against the abrogation of the Reciprocity Treaty of 1854, which admitted lumber from Canada free of duty. Portland is the natural entrepôt of Canada for six months in the year. It is one of the great highways connecting the producing territories of the great West with the Atlantic seaboard.

BUFFALO, ON LAKE ERIE, 1861.—Navigation on Lake Erie opened 13th April; but the Erie Canal, which connects this port with New York, was not opened till May 1st, and continued open till December 11th.

Principal import trade, grain and timber; and owing to the closing of the Mississippi river and the cutting off of the Southern market, the arrivals for shipment by the Erie Canal have been unprecedented.

*Receipts of Grain at the Port of Buffalo.**

	1857.	1858.	1859.	1860.	1861.
	Quarters.	Quarters.	Quarters.	Quarters.	Quarters.
Wheat	1,040,000	1,334,000	1,180,000	2,310,000	3,400,000
Indian corn	730,000	840,000	390,000	1,400,000	2,630,000
	1862.	**1863.**	**1864.**	**1865.**	
Wheat	3,800,000	2,655,000	2,222,000	1,555,000	
Indian corn	3,036,000	2,512,000	1,360,000	2,480,000	

Grain and cattle chiefly derived from the prairies of the West.

1862.—Imports of grain much increased; traffic diverted from the usual routes to the seaboard, to the canals and railways of this State. The Western States are adding to the number of their mills.

Movement of grain from Erie ports larger than in any year during the last ten years.

Wheat supply chiefly from Chicago, Milwaukee, Toledo, Sandusky, Cleveland, and Detroit.

1865.—On flour, wheat, and oats, there was, it will be observed, a decrease of imports in 1865, which is, as nearly as possible, counterbalanced by the increase on Indian corn, barley, and rye. The deficient wheat crops of the last two seasons on this side of the Atlantic, and the abundant harvests on the other side—tending together to diminish at once both supply and demand—sufficiently account for the falling off of grain exports in 1865 as far as wheat and flour are concerned. The crop of Indian corn in 1865 was the most abundant on record, and the price of this cereal was further affected by the closing of many of the Western distilleries in consequence of the high excise tax upon whisky. The crop of barley was also rather above than under the average, and the duties on spirits have greatly increased the demand for this cereal by the brewers, who are profiting largely by the financial burdens thrown upon the distiller.

1867.—The principal railways centering in Buffalo are the Lake Shore Line, which places the town in communication with the great railway system of the West; the Buffalo and Lake Huron Line, connecting with the Grand Trunk Railway of Canada; and the New York Central and Erie Lines, both of which terminate in New York.

The Lake Huron Railway crosses the Niagara river by means of a floating steam bridge, which is registered at the Custom-house as an ordinary steamer. The traffic of this line is, therefore, included under the head of "lake commerce," as above given.

* Quantities nearly corresponding are noted as "Exported by Canal."

The main trunk of the Erie Railway, along which by far the greater portion of its traffic flows, has its Western terminus at Dunkirk. A branch line, starting from Hornungsville, connects it with Buffalo, and is commonly known as the Buffalo, New York, and Erie division of this important railway.

The total length of the Lake Shore, Erie, and New York Central Railways is 1244 miles. Buffalo is essentially a port of importation, above all for the article of grain which forms by far the largest item on the list of Canadian produce. The Reciprocity Treaty was equivalent, as far as it went, to the commercial "annexation" of Canada. The argument, therefore, of the "balance of trade," whatever it may be worth, would have no more application to the preponderance of grain importations from Canada than it has to a similar preponderance from Chicago.

Canadian Produce imported free under the Reciprocity Treaty.

	1861.	1862.	1863.	1865.
Flour .. .. .. cwt.	291,582	183,435	241,308	233,644
Grain (all kinds). bus.	950,787	912,304	977,228	1,301,409

PHILADELPHIA, for the same reason (the war and diverting of traffic) rose from very trifling exports in the previous four years to 250,000 quarters of wheat in 1861: flour, 336,000 barrels.

MR. HEMAN'S CONSULAR REPORT FOR 1865.—The deficient wheat crops of the last two years on this side of the Atlantic, and the abundant harvests on the other side, account for the falling off in the wheat and flour trade; which, however, is nearly counterbalanced by the increase in Indian corn (of which the crop of 1865 was the largest on record, viz., 88,000,000 quarters, irrespective of the Southern States), barley, and rye.

The deficit of the wheat crop, as compared with that of 1864, has been estimated at 3,280,000 quarters.

Probable average product of wheat is 15 bushels per acre, at 60 lbs. weight per bushel: on the best farms 50 bushels an acre is a common yield. Maize averages 50 bushels an acre: best farms 80 bushels.

1865.—"Owing to the fatal destruction of human life caused by the four years' war, the price of labour has ruled very high in all branches of industry; nevertheless, with the sole exception of wheat, the staple products of the State have been amply remunerative."

PHILADELPHIA, PENNSYLVANIA, *June* 7, 1867.—Besides its vast mineral wealth this is a prominent agricultural State; the character of the agricultural products is seen in the folowing Table for the year 1866:—

Crops.		
Indian corn	quarters	4,480,000
Wheat	„	1,315,000
Rye	„	821,000
Oats	„	6,870,000
Barley	„	77,000
Buckwheat	„	1,210,000
Potatoes	bushels	15,636,000
Tobacco	pounds	4,960,000
Hay	tons	1,642,000

Quantity of land in cultivation, 6,437,396 acres. The Gulf States, in view of a possible deficiency in the cotton crop, are making great efforts to bring into cultivation a fibrous plant called "ramie" (Bæhmeria tenacis-

sima)* belonging to the "Urticaceæ," or nettle family. It is a vigorous plant, and its fibre is superior to the best European hemp, the best Belgian flax, or linen fibre; it threatens to become a formidable rival to the cotton plant and to flax.

NORTH CAROLINA.—REPORT OF MR. VICE-CONSUL WALKER ON THE TRADE AND COMMERCE OF NORTH CAROLINA, 1867.—Geographically, North Carolina is situated half-way between New York and the Gulf of Mexico, being included between the parallels of $34\frac{1}{2}$ degrees and $36\frac{1}{2}$ degrees. It extends from the Atlantic coast 500 miles westward, stretching more than 100 miles beyond the Blue Ridge Mountains, and containing an area of 50,000 square miles, having, therefore, the same extent as the State of New York. This territory divides itself naturally into three well-marked sections: on the west, the mountainous plateau having an elevation of 2500 feet above the sea, and being traversed by several chains of mountains, many of whose peaks attain an elevation of nearly 7000 feet: on the east lies a low plain, nearly level, partly alluvial and partly sandy, extending about 150 miles from the coast: and between these two spreads the hill country, whose elevation rises gradually from 200 or 300 feet on the east, to 1200 feet at the base of the mountains.

The eastern section is mostly covered with pines (*Pinus australis* and *P. taeda*), the middle and western with vast forests of oaks (of many species) interspersed with the poplar, hickory, walnut, maple, &c. Seven large rivers, with their numerous tributaries, traverse the State, furnishing unlimited water-power as they flow down from the mountains through the middle section; and as they move with a moderate current, across the champaign country, on the east, into the chain of sounds which skirt the coast, they furnish, with these, an aggregate of 900 miles of inland navigation, which might be doubled by carrying westward the system of slack water improvements already commenced. With these navigable waters is interlaced the railroad system of the State, amounting to 998 miles completed, and 400 more in progress, which, with about 350 miles of plankroads and turnpikes, brings the sea coast into ready communication with every part of the State.

The Soil is very various; alluvial and peaty communications abound near the coast and along the rivers, while in the middle and western regions the soil is mainly of granitic origin, and represents every grade of sandy or clayey loam of various fertility.

The Climate has also a wide range, being tempered on the seaboard to something like the mildness of that of the Gulf States, while in the mountain region it approaches the rigour of New York. In the middle section, which constitutes the larger part of the State, and represents the average climate, the mean annual temperature is 60 degrees (Fahrenheit)—the mean summer temperature, 75 degrees; mean winter, 43 degrees; extreme summer (diurnal), 89 degrees; extreme winter (diurnal), 20 degrees; average absolute minimum, 12 degrees. The annual fall of rain is 45 inches. The number of cloudy days in the year is 130; rainy days, 60.

The Vegetable Productions are numerous. The most important are wheat,

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* Bæhmeria, or Urtica tenacissima, is indigenous in Sumatra, Rungpore, &c. Dr. Roxburgh speaks of the beauty, fineness, and softness of the fibre: he found it the strongest of all the vegetable fibres which he subjected to experiment. It is called *Rami* by the Malays, who cultivate this plant for twine and sewing-thread, which they use to make fishing-nets, &c. Rami is found throughout the northern as well as the southern parts of India. It grows from cuttings, like the willow, throwing up numerous shoots, which may be cut down five times a year.—Royle, 'Himalayan Botany,' p. 334.

corn, oats, rye, potatoes, sweet potatoes, peas, rice, cotton, tobacco, turpentine, grapes, and fruit. Wheat and corn are produced with facility and abundance in all parts; rye, oats, and potatoes, flourish in the middle and western regions; rice, sweet potatoes, and peas in the eastern; tobacco in the middle; cotton in the southern counties of the middle, and in the eastern section; turpentine and pine lumber are peculiar to the east. The fruits most extensively and largely cultivated are the apple, peach, pear, and cherry, represented by numerous varieties. No part of the continent is better adapted to these than the middle and western regions. The principal grasses are the orchard, herd's, timothy, and blue, to which must be added clover and lucerne. All these flourish in the middle and western regions, and some of them grow wild; hence, stock raising is easy and profitable. The stock chiefly raised are horses, mules, cows, sheep, and hogs. The grapes usually cultivated, besides foreign varieties, are the Scuppernong, Catawba, Lincoln, and Isabella, all natives of the State, the first three being excellent wine grapes. The following abstract from the United States Census Report for 1860 will best show the productions and capabilities of the State:—

		Annual Product.
Live Stock		3,326,000
Wheat	bushels	4,700,000
Corn	„	30,000,000
Oats	„	2,800,000
Rye	„	437,000
Peas	„	1,900,000
Potatoes	„	830,000
Sweet Potatoes	„	6,140,000
Cotton	lbs.	58,000,000
Tobacco	„	32,900,000
Rice	„	7,600,000
Wool	„	883,000
Honey	„	2,055,000
Turpentine	barrels	1,000,000

The Manufactures are chiefly cotton, wool, spirits of turpentine, lumber, iron, and paper.

Minerals.—The most important of these are coal, iron, gold, copper, silver, lead, plumbago, limestone, marble, agolmatolite, soapstone, manganese, whetstones, grindstones, roofing slates, porcelain clay, and fire clay. The coal is bituminous, and exists in two beds, situated respectively 100 and 200 miles from the coast, on Cape Fear River, and on Dan River. It is abundant, accessible, and of good quality. Iron ore, of excellent quality, abounds in all parts of the State; the principal seat of its manufacture being on the Cape Fear, Catawba, and Yadkin rivers. Gold is found in almost all parts of the State, especially in the middle region; the annual product for many years has been 250,000 dollars. Copper mines abound in the middle, northern, and western counties. Plumbago is found in great abundance near the capital, and again in the western region; marble in the middle and western; and marl everywhere in the eastern section.

A chain of silver and lead mines (containing gold also) traverses the central portion of the State.

The Population in 1860 was 992,622, of which one-third are coloured, and 3298 are of foreign birth. One-tenth of the population live in towns and cities.

Land.—According to the census of 1860, there were 6,500,000 acres of improved land, being about one-fifth of the area of the State. The price at which these lands are held ranges from about 3 dollars to 100 dollars per acre; the average would be about 7½.

The late war has very materially interrupted the industry of the State, and the capital of all who invested in bank and many other joint stock companies has been nearly annihilated.

The new system of free labour has of necessity been (without experience or organisation on the part of employers) an experiment, upon the results of which data for future operations will be furnished.

As respects the labour performed by the freed class, reports are various. The majority would indicate that a good day's work is not obtained by the employer for a good day's wages; and also, that in many cases, little dependence can be placed on their adhering to a contract; and in most cases, where they have rented land, or worked "on shares," they have failed in fulfilling their engagements. In other respects they have generally conducted themselves well under their newly-acquired privileges.

Agriculture.—Indian corn is the staple cereal of the State, and upon a good or bad harvest of this grain much of domestic prosperity depends. The north-eastern counties, in most seasons, supply other parts of the State, and send a considerable surplus to Baltimore and Norfolk.

Rice.—Under the new system of free labour many believed that the cultivation of this cereal would be abandoned, because of the unhealthiness of the rice lands and the expected scarcity and unsteadiness of labour and labourers. The production has vastly decreased this year; but it appears probable that the cultivation will henceforth considerably increase, as the stimulus of high prices is beginning to be felt.

Tobacco.—The cultivation of this product is confined to the northern counties of the State which border on Virginia, and nearly all the tobacco grown in North Carolina finds a market or outlet in Norfolk, Petersburg, or Richmond. It cannot be said that Wilmington is a tobacco market.

Wheat.—This grain has been, during some years, produced in such abundance as to furnish nearly the domestic demand. The same cause that has so materially curtailed the corn crop the two years last past has likewise nearly ruined the wheat crop, viz., unseasonable drought. It may also be remarked that the culture of this cereal is very defective; but a change for the better has begun to take place, which, in due time, may eventuate in greatly increased production.

Cotton.—The State of North Carolina was scarcely reckoned in former years as a cotton-producing country. A large portion of North Carolina cotton finding an outlet from the southern counties *viâ* Charleston, and much more through Norfolk in Virginia, it happened that but a comparatively small portion of the cotton of North Carolina was shipped through the ports of the State—Wilmington and Newberne.

On the further extension and completion of the Wilmington, Charlotte, and Rutherford Railway, the cotton of the southern counties of the State will be shipped at Wilmington.

The iron and coal beds in Chatham country were worked during the war.

Rafts of timber are floated down the Cape Fear River to Wilmington, and are there sawed into lumber—boards, planks, and scantling.

Turpentine, Crude—is the gum which exudes from the wounding or "chipping" of the pine-tree. It is collected and put into barrels in the forests, and carted to the still.

On distillation, the spirits are put into 40 or 42-gallon casks, and the *residuum* undistilled is rosin. Tar is produced by cutting down old turpentine trees, and sweating the tar from them in close kilns. A great many of the inhabitants of the eastern counties are employed in the turpentine business.

In Wilmington there are the following distilleries:—A. H. Van Bokkelen,

7 stills, capacity, 400 to 500 barrels crude turpentine; J. R. Blossom and Evans, 4 stills, capacity, 200 barrels; Eagle Distillery, and three smaller distilleries. The products of these works are spirits, turpentine, rosin, rosin oil, varnish, &c.

Throughout the eastern part of the State there are many single stills.

Factories and other Industrial Pursuits.—There are no people more easily stimulated by wages or profit than the labouring and manufacturing population of North Carolina. Their enterprise and perseverance in making cotton and woollen cloths for themselves and families, during the late war, are beyond praise. In many humble dwellings might be seen hand and loom-wrought goods which would attract notice in any market; and, in point of intelligence and quick apprehension, these people are behind none.

The want, hitherto, has been home capital sufficient to employ the thousands who at present are compelled to live, or barely subsist, upon a soil in many places poor, but always poorly cultivated. There is a general belief prevalent that North Carolina is to become a great manufacturing State; and this belief, of itself, will tend to make it so. There is no reason why it ought not also to predominate in agriculture. In the meantime wages are low, and labour for money wages is abundant. A rapid improvement is looked for, if only capital, foreign or domestic, be obtainable.

TEXAS.—GALVESTON, 1867.—In a State of such vast extent as Texas, there will naturally be a large variety of climate, soil, and production. Some products are common to all parts of the State, of these, corn (Indian) is not only the most important, but is the most easily raised, and conduces, in a large degree, towards the home support of the people. Potatoes and vegetables are also cultivated with little labour and expense.

Cattle, sheep, horses, and hogs, thrive in nearly all parts of the country. The western portion of Texas, although not well adapted for cultivation, furnishes pasturage for innumerable herds of cattle, which can be reared to an illimitable extent, and sent to market with no other expense, the year round, than that of herding and branding.

Some of the finest sheep ranges may also be found in th is part of the State and men of small means have amassed large fortunes by careful attention and a judicious mixture of stock.

The cotton region of Texas comprises about one-third of its area: the bottom lands of the Brazos, Colorado, Oyster Creek, Old Caney, Sabine, the Trinity and Red River, are the best adapted for its production, and, in ordinary seasons, will yield one bale of 500 pounds per acre.

The vast wealth of the cotton region of Texas is still undeveloped, and millions of acres of the finest cotton lands are still lying useless, as they were 50 years ago.

The cotton crop of the whole State, for the past year, will amount to 200,000 bales, averaging about 490 lbs. to the bale: the average crop, before the war, nearly 300,000 bales. A large portion of the cotton produced in Texas, in the absence of railroads, which would otherwise convey it to this city, is taken to New Orleans by way of Red River and the Mississippi; the remainder is chiefly shipped from this port.

The wheat region of Texas, though not so large as that adapted to cotton, comprises some 30 counties, having an area of more than 27,000 square miles, including the north-western portion of the State, where the soil and climate are exceedingly well adapted for its successful cultivation.

Some idea of the steadily increasing importance of this product may be formed from the fact, that more than 7,000,000 bushels of wheat were produced during the past year against 50,000 bushels in 1850; yet this quantity will be

considerably enlarged when the country is opened up by railroads, and greater facilities are offered for exportation.

Such is the congeniality of climate and soil that Texas wheat matures at least six weeks earlier than in any other portion of the United States, and new flour can be manufactured in the beginning of June; this will always give it an advantage over any other market.

The growth of wheat has received a great impetus since the close of the war through the influx of immigrants from the neighbouring States: those who have capital can purchase lands in any quantities at from two to three dollars per acre, and those who have not the means can always find employment with good wages, which, with a little thriftiness, will soon enable them to become proprietors, and to cultivate the soil on their own account.

The common sugar-cane grows luxuriantly in some portions of the valleys of the Brazos, Colorado, and Trinity; but owing to the want of capital, also to the great expense of sugar-houses and machinery, it is cultivated to only a limited extent. The annual production is between 7000 and 8000 hogsheads.

Tobacco, rice, hops, flax, and hemp, can be produced in various parts of the State.

Population and Immigration.—The population of Texas, including whites and blacks, is generally believed to be from 1,000,000 to 1,200,000; but in the absence of statistical information, this report cannot with safety be relied on.

During the war, and since its close, a large immigration has taken place from the adjoining States, and since the ports have been opened, several thousands have arrived from the north and from Europe; it is the opinion of our most intelligent citizens, that within the next ten years, Texas will be one of the most populous States in the Union.

Great efforts are being made to induce immigrants to settle here; companies have been organised, subscriptions raised, and agents engaged to further this object.

Prospectuses have been issued setting forth the advantages of climate, soil, and production.

Private individuals have also brought a number of labourers into the State to meet their own requirements, and it appears to be the general desire to supersede, as far as practicable, black by white labour.

Industries.—The manufacturing industry of Texas has received a considerable impetus since the close of the war, and many Acts were passed by the late Legislature incorporating various companies. The numerous cotton and wool factories now in existence turn out about 11,000 yards per day. As the raw material can be obtained on the spot, a great saving is effected in commissions, freight, and charges of different kinds.

Numbers who, before the war, depended entirely upon agricultural pursuits, are now investing their capital, and devoting their attention to the production of cotton and woollen fabrics.

The profits generally resulting from these undertakings are enormous, and this of itself will serve as an incentive to further exertions.

Several large orders have been sent to England for machinery to establish new mills, and it appears to be the determination of the people to supersede the Northern and European goods, as far as practicable, by those of home manufacture.

During the past year the city of Galveston has made rapid strides in wealth and prosperity. Before the war the population was about 10,000; it is now nearly 20,000, or twice that number. A charter has been granted by the Legislature for the construction of street railroads, one of which has been com-

pleted for a distance of nearly two miles. New wharves and cotton presses have been erected at a vast expense. Two National Banks have been established with a capital of 200,000 dollars each. Several lines of steamships have been put on to New Orleans and to New York. Twenty large, handsome, three-story iron-front buildings have been built, besides over 1200 habitations. The streets present an air of bustle and activity not often seen in much larger cities.

Rents, however, are very high, and so are all kinds of labour, building materials, and the necessaries of life.

NEW ORLEANS.—Report by Mr. Consul Donohoe for 1866.—The export of cotton from New Orleans, during the last five years, has been as follows :—

Years.	Bales.
1861–2	27,678
1862–3	23,750
1863–4	128,130
1864–5	192,351
1865–6	768,543

There has been an improvement in the tobacco export trade during the past year. The production in the United States is very large, but it reaches New York—the great emporium of the trade of this country—by other routes than that of the Mississippi river. Very little of the tobacco produced in Kentucky and Tennessee, which formerly used to reach a market *viâ* New Orleans, now comes this way.

The export of tobacco from New Orleans, with destination, during the past ten years, has been as follows :—

Years.	Great Britain.	France.	North of Europe.	South of Europe, Mexico, &c.	Coastwise.	Total.
	Hhds.	Hhds.	Hhds.	Hhds.	Hhds.	Hhds.
1865–66	1,509	839	1,566	870	2,137	6,921
1864–65	185	19	..	..	1,627	1,831
1863–64	..	7	123	3	664	797
1862–63	569	3,969	2,094	2,383	3,541	12,556
1861–62	..	100	536	1,248	340	2,244
1860–61	7,464	4,544	6,577	18,915	2,306	39,806
1859–60	17,165	8,419	23,322	24,335	9,448	82,689
1858–59	20,144	9,876	23,599	19,910	6,445	79,974
1857–58	13,733	16,164	6,306	26,081	9,931	72,215
1856–57	11,446	1,288	15,150	13,665	8,632	50,181

The production of sugar and molasses in this State shows an improvement upon last year, but there is no foreign export of these articles.

The other articles exported, or sent coastwise, from this port, are flour, pork, bacon, lard, beef, lead, whisky, and corn. The quantity sent to Great Britain of the above articles from this port is merely nominal, though a large shipment used to take place in former years.

Large quantities of dry goods, wine, crockery, and beer, have been received by a line of steamers running direct from Liverpool to New Orleans; but still larger quantities of the same articles are received *viâ* New York. The amount of duty received at the New Orleans Custom-house, during the year ending 31st December, 1866, amounted to 5,439,989 dollars and 80 cents specie.

The past season has been a bad one for the cultivation of cotton ; high water in the rivers, and the flooding of the plantations upon low lands, have been very damaging to the crop. In the State of Louisiana alone, seven or eight of the principal parishes were, during a considerable period, submerged, and their crop in consequence has been extremely small. The State of Mississippi has suffered severely also from this as well as other inflictions. The damage from heavy rain, and the ravages of the worm, have been very great ; not more than about three-fifths of the cotton lands which were in cultivation in the season of 1859-60 have been under cotton this season.

General Remarks.—As to the efficiency of negro labour under the free system as it now exists, the accounts received from the country would lead me to suppose that it is far more effective than the Southern people supposed it would be. There are certain places where it has not been so, and where the negroes have not carried out the contracts made in the early part of the year ; but in many of such cases I think it is highly probable the negro has not been properly treated by those employing him, or has been enticed away from his work by parties interested in procuring labourers for other parts of the country. There has no doubt been a scarcity of negro labour in the country, as many negroes who have been accustomed to a plantation life have flocked to the towns ; but this is a matter that will soon correct itself, as those who find they cannot obtain work in the town will soon be obliged by their necessities to seek it on the plantation.

The want of capital is severely felt in the Southern States, as from the uncertainty attending the cultivation of the cotton staple, planters find it extremely difficult, in fact nearly impossible, to obtain advances upon the growing crops; but I still see no reason to change the opinion I expressed in my report of last year, that an energetic man, of moderate capital and free from debt, who will treat his labourers well, will ultimately realise a competent income from the cultivation of cotton in the Southern States.

The system which has been lately inaugurated by the Freedmen's Bureau of affording gratuitous transportation to the needy of the coloured race wishing to emigrate from the North-Eastern States to South, is likely to have a good result. It will bring the negro to those States where there is no dearth of employment, and where they will find planters waiting to engage them at a good rate of wages, and where they will be protected in their rights by the officers of the Bureau. We may ultimately expect to find cotton cultivated more generally on much smaller plantations than at present, and men with smaller capital than those now engaged in planting will find that, employing but a few hands, they will be able to realise a handsome return for the money invested in either buying or leasing a few acres of cotton-producing-land. The labourer will work better under the personal supervision of the owner of the land than he will under that of an overseer.

Everything considered, I cannot believe in the gloomy views expressed by planters. A great change has no doubt taken effect as regards the system of labour, but I look forward to the period when Southern men will consider that change a blessing in many ways.

SAVANNAH. Report by Mr. Consul Tasker Smith, on the Trade and Navigation of the Port of Savannah, for the Year 1866.—Upon instituting an examination into the extent and variety of the trade and navigation which were carried on at Savannah during the past twelve months, it is evident that progress has been made towards that point of commercial importance which, prior to the recent internecine conflict, this city enjoyed, as the principal port of the State of Georgia, and as one of the four great shipping places for the cotton and rice productions of the South.

It is not reasonable to institute any comparison of the activity of 1866 with that displayed in 1865, the first moiety of which was passed with the port closed to all foreign relations, when military occupation dominated in the State, and when no amalgamation had taken place between the white and coloured classes to work together again. It is better, perhaps, to judge the commerce of the past year in juxtaposition, wherever practicable, with such data as have been preserved, and refer to the period immediately preceding the war, when peace was flowing on in uninterrupted current, and when the resources of the State were in a high degree of development.

Such a comparison will aid in demonstrating how far from a position of total inactivity recovery has taken place towards former prosperity during the first clear twelve months of relegation to those agricultural pursuits which were so rudely interrupted by civil warfare.

Imports.—Under the head of importation, it is to be noted that almost all agricultural and domestic implements, and wants of every description, have been supplied coastwise from the Northern States, and the activity of this portion of the commerce, which centralizes at Savannah, may be judged by the number of vessels (steam ships fully 150, besides over 300 sailing ships) which arrived during 1866 from Northern ports, and which, as a rule, brought full cargoes of goods and provisions for the consumption of this city, and for the up-counties and towns of Georgia.

Exports.—Cotton and timber continued to be the principal exports. Rice was cultivated to a small extent, but had not figured as an article for shipment.

With respect to the supply of cotton for exportation, the Table below demonstrates the quantities which reached this port during the respective years 1860 and 1866 :—

	1860.	1866.	Decrease.
	Bales.	Bales.	Bales.
Approximate quantity of Cotton received at Savannah January 1 to December 31	540,000	273,000	267,000

This shows a decrease of 267,000 bales; but it is to be borne in mind that the crop of 1860 was the largest ever known to have been made in Georgia, amounting over the whole State to 750,000 bales, the ordinary crop usually going not far beyond 400,000 bales.

The labour market, at the commencement of the year, was not on a firm basis; and many planters, after preparing their land and sowing seed, found that their field hands deserted them at critical times, and that their labour was doomed to be fruitless. In the second place, some planters found that the inferior seed which they sowed at the beginning of 1866 failed to spring up or "stand," thus necessitating a second or renewed application of seed, the plants from which, owing to the lateness of the season when it was placed in the ground, became eventually seriously affected before reaching maturity, by the long drought which prevailed.

Railroads.—Two termini of the railways which intersect Georgia are situated at Savannah. These railroads brought in cotton and other products, and disseminated through the country the goods which arrived from the North, a large amount of traffic having thus been carried on.

The lines which start from Savannah are the Central Railroad and the Atlantic and Gulf Railroad. The former connects the seaboard with the middle

and west counties of Georgia, and forms a portion of a network which embraces the cities of Northern and Western States of the Union; the Gulf and Atlantic Railroad runs to the southward, reaching Florida.

Telegraphs.—Telegraphic communication is complete with the North and West, and telegrams have been sent to and from England by way of New York, and thence to the Atlantic cable; daily news, too, from Europe, New York, Washington, New Orleans, and other points, reaches the city press and the public here through the wires.

X.—*The Agriculture of Staffordshire.* By H. Evershed.

A brief geological description may be appropriately preceded by an estimate of the area occupied by the different formations :—

	Acres.
Igneous rocks	468
Silurian beds	4,000
Mountain limestone	15,000
Yoredale rocks and millstone grit	64,000
Coal measures	96,000
Permian	4,000
New red sandstone	540,000
Lias	5,000
Total	728,468

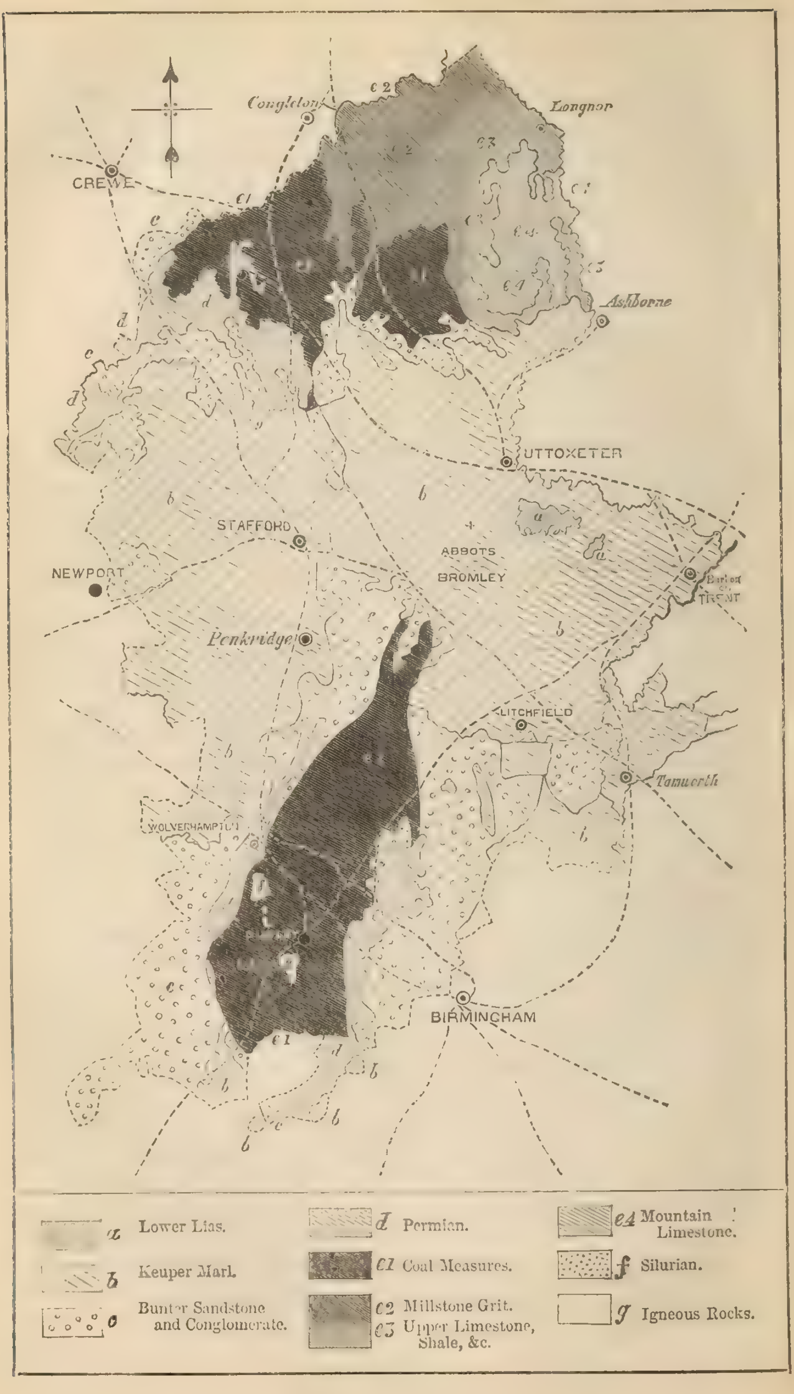
In North Staffordshire the carboniferous series of rocks consists, in descending order, of coal measures, millstone grit, Yoredale rocks, and mountain limestone, succeeding one another in natural order. A long synclinal called the Goyt Trough runs due south from Mottram, near Staleybridge, by the east of Leek to the Cheadle coal-field.*

This hollow, or trough, is for the most part bounded on either side by ridges of millstone grit. The coal-field of the Potteries is enclosed on the north by the ridges of grit which form the northern boundary of the county at Mow Cop and Cloud. At Biddulph commences the valley, called Biddulph Trough, which runs southward to Stoke and Longton. A parallel ridge runs on the east of this valley from above Biddulph through Wetley Moor, and forms the eastern boundary of the Pottery coal-field. Another ridge, consisting of coal measures, passing southward from Mow Cop towards Stoke, forms its western boundary. Norton-in-the-Moors is the northern limit, in the valley, at which coal has been worked. The lower coal measures, consisting of thick masses of shales, and two or three thin coals, occupy the hollows of the basins that have been described. New red sandstone rocks appear on each side of the Churnet Valley from a little to the north of Leek to about five miles below it. Two little patches of mountain limestone peep through the over-lying beds at Mixon, east of Leek.

The mountain limestone commences at Wever, extending to Caldon, Waterfall, Grindon, and Butterton, and thence towards the Dove, which separates it from the more extensive limestone district of Derbyshire. Wever Hill forms the southern

* See a paper in the 'Quarterly Journal of the Geological Society,' 1864, p. 242, by Messrs. Hull and Green, Geologists of the Geological Survey of Great Britain, "On the Millstone Grit of North Staffordshire," &c.

GEOLOGICAL MAP OF STAFFORDSHIRE.



point of the range which has been called the backbone of England, and which passes through Derbyshire, Lancashire, and Yorkshire to the Scottish boundary. This abrupt terminal point, 1200 feet above the level of the sea, forms a conspicuous object from the wide plain of Staffordshire, which it overlooks. The rounded outline of the hills is seen in the distance from the farthest limits of the county, and is frequently the picturesque termination to a landscape composed of undulating pastures, which would be monotonous but for this distant fringe.

The country lying between the mountain limestone and the Pottery coal measures consists of Yoredale rocks and grits. In the paper already referred to, the Yoredale rocks are described as consisting of thick coarse sandstone beds, thin limestones, and quartzites. The latter have generally a firm close grain, and a plentiful siliceous cement; they do not crumble by exposure like the millstone grits; the fracture is clean and bright, while the freshly broken surface of the gritstone is rough. On Gun Hill, near Leek, these beds are very hard subcrystalline quartz rocks. Some of the beds have a calcareous cement. The limestone shales, forming the lower division of the Yoredale rocks, vary from black earthy beds to pure crystalline limestones containing many fossils. The Yoredale beds cover the whole of the country west of Longnor up to the edge of the Goyt Trough. They are much tossed about and broken by faults, but the three groups can be made out. The Yoredale quartzites are well shown on Lady Edge and the neighbouring hills, and the bottom shales and limestones will be found in many of the brook-courses along the deeper valleys. Farther to the west the Yoredale quartzites rise to the summit of Gun Hill, when they roll over and plunge sharply down to the west until they abut against an anticlinal fault. Beyond this anticlinal fault is the Rudyard Basin, lying between it and another break about a couple of miles to the west. Then follows another sharp saddle formed by the Yoredale quartzites, and beyond this the Biddulph Trough, containing here the lower coal measures, bounded by bold ridges of the millstone grit, which form Cloud Hill, and extending to Mow Cop on the west, and to Knypersley and towards Bagnall on the east. The millstone grit scenery is marked by long lines of terraced or steeply scarped hills, contrasting with the rounded edges of the limestone hills. The same kind of outline is continually seen in the gently rising surface of moorland broken off along a sharp line of cliff. The summits of the ridges are invariably composed of grit or sandstone, the flanks of the hills and the valleys of shale. The steep face of the escarpment always tends to run in the line of strike, and looks in the direction opposite to the dip; so the observer can often trace the

geological structure by the surface configuration alone. The "rough rock," or 1st grit, forms the upper bed of the millstone series. It is a coarse massive grit, crumbling under the action of the air, on account of the decomposition of felspar, which it contains in large quantity. The 3rd grit is called the escarpment grit. The edges formed by its outcrop often run for miles in an unbroken wall of rock. Between the grit and the mountain limestone lies a group of shales and sandstones. A close-grained grit is largely quarried for foundation-stones, &c.

In the South Staffordshire coal-fields the mountain limestone and millstone grit, on which the Pottery coal measures rest, are entirely wanting. The older strata are represented in the range of hills thrown up at Sedgeley, Dudley, and Rowley Regis, which run in a south-eastern direction, and by their intrusion into the centre of the coal-field divide it into two portions. At the two first-named places the beds consist of members of the Upper Silurian limestone. At Rowley the intrusive rock is of basalt. Igneous rocks also appear at Wednesfield, near Wolverhampton, and near Bentley Hall. Around Walsall the Woolhope and other limestone beds have also been lifted up from beneath the coal strata. The southern coal-field, narrowing as it extends northwards, is prolonged through Cannock Chase to Beau Desert and Brereton, where it terminates, in what looks, on a map of the strata, like the point of a promontory extending into the great sea of new red sandstone, which spreads over the greater part of Staffordshire.

The new red sandstone consists of the Bunter conglomerates and sandstones, Keuper sandstones and red marls. These beds cover the large tract of country lying between the North and South Staffordshire coal-fields, and, except the patches of lias in Needwood Forest, extend without intermission from Tamworth and Burton to Cheadle. Nearly the whole of Cannock Chase, east of Cannock, consists of Bunter conglomerates, generally in an unconsolidated condition. The surface generally presents a curiously rounded appearance. These beds also occur at Whitmore and Cheadle. Castle Ring, at Beau Desert, 900 feet above the sea-level, is capped with a deposit of drift gravel 24 feet deep.

The Keuper beds consist of even-bedded sandstones with marly interstratifications, as at Ingestre, Sandon, near Stafford, between Lichfield and Beau Desert, and at Alton Towers. The lower division of the Keuper beds is quarried at Hollington, where it assumes the form of a white siliceous freestone, which is largely quarried here and elsewhere for building.

The marls are a very important deposit in an agricultural point of view; they generally occupy broad level tracts of country, and in some localities they attain a thickness of 1000

feet. These beds overlie the Keuper sandstones. They have been largely worked for agricultural purposes, as the numerous marl-pits in almost every part of the county testify. This marl contains sulphate of lime in a state of fine division, as well as in large masses, as shown in the famous gypsum quarries at Castle Hays, Fauld, and elsewhere.*

It also occasionally contains carbonate of lime. Marl varies greatly in character and agricultural value; in some cases it is by no means fertile, in others it is remarkably so. It sometimes consists of a fat rich earth, at other times it contains a large quantity of sand or of poor clay. The leanest marl is generally blue; the rich unctuous marls are more often red.† The other formations in the county are of insignificant extent; they are named here out of their natural order.

The Permians, consisting of breccias, sandstones, marls, and clays, occur on both the east and west flanks of the South Staffordshire coal-field, and occupy a considerable tract of country to the south and west of the Pottery coal-field, especially around Barlaston and thence to Trentham.

The lias appears on the Ordnance Map in two small patches at Christchurch-on-Needwood and on the Forest banks in the neighbourhood of Bagot's Park. It consists of sandstones, dark

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* The marl beds yield salt extensively in some parts of England, as at Droitwich, Shirleywich, &c. We learn from Mr. Brown, of Burton-on-Trent, that some slightly brackish streams run from Dunstall, four miles above Burton, across the meadows at Bramstone, and that four sea-side plants are found near the Lily Pits on the banks of these rivulets. They are *Juncus Gerardi*, *Scirpus maritimus*, *Apium graveolens*, and *Triglochin maritimum*. Mr. Brown writes:—"It is a curious subject for inquiry whether these species have continued to exist where they now grow ever since the tidal waves" (at some former geologic period) "reached as high up the valley as Bramstone, or whether they have been developed in congenial soil from seeds accidentally carried by wild fowl up the course of the Trent from the sea-side, over a distance of one hundred and forty miles."

† The use of marl, once universal, of this formation, is now entirely discontinued, because other fertilizers can be obtained in a cheaper form. The following analysis of the brewing waters of Burton show some of the fertilizing constituents contained in red marl. It is taken from a very able paper on "The Geology and the Mineral Waters of Burton-upon-Trent," by Edwin Brown, F.G.S., read to the members of the British Association, in 1865.

Analysis of mineral matter contained in Water from a Well sunk through the Gravel and into the underlying Red Marl.

	Grains in an Imperial Gallon.
Sulphate of lime	70·994
Carbonate of lime	9·046
Carbonate of magnesia	5·880
Sulphate of magnesia	12·600
Sulphate of sodium	13·300
Chloride of sodium	9·170
Sulphate of potassium	·966
Carbonate of protoxide of iron	1·218
Silicic acid	1·120
	124·294

blue clays, shales, and white marls containing thin bands of limestones. The famous oaks in Bagot's Park stand on the clays of this deposit. Quoting again from Mr. Brown's paper on the geology of Burton, we learn that—"A few thin beds of lias have escaped denudation on the highest parts of Needwood Forest. I have ascertained that these extend further towards Burton than is indicated by the Government Ordnance Map.* The lias beds on the Forest unfortunately contain none but useless materials; and they are chiefly remarkable for the deterioration that has taken place in the agricultural land wherever they are found, and for the consequent lessened rent roll of the Duchy of Lancaster. It would seem to be a matter for regret that Needwood Forest did not remain an age or two longer under water, so that it might have got rid completely of this incubus that blights its otherwise fair surface."

The river valleys contain principally gravels derived from the Bunter beds, and alluvial clays and sands. I am much indebted to Mr. Molyneux, of Burton, for information on the subject of the preceding pages.

Staffordshire might be made more regular in hape by shortening its extremities, drawing a boundary line through Wolverhampton and Walsall in the south, and through Longton and Wootton-under-Wever in the north. The loss of these districts would not reduce very much the number of productive acres, but it would cut off the northern and southern coal-fields and the Potteries, as well as the limestone hills and the picturesque scenery of the moorland, and this represents a loss of manufactures and of population which would be disastrous to agriculture. Excluding the light-land tract which surrounds the county town and extends from Trentham through Cannock Chase and Lichfield to Tamworth, the county consists chiefly of the cheese-making districts, where pasturage prevails. The increasing profit of dairy farming, as compared with arable cultivation, on strong land, has occasioned a great portion of such land to be laid down in permanent pasture during the last few years. The heavier marls and clays are costly to work and unproductive of stock and meat, except under an expensive system of root cultivation, which the practical man knows to be a hazardous and very often an unprofitable investment. Notwithstanding the good average quality of the soil in the dairy district, it is less productive of corn, especially of wheat, than are the great corn districts, and it is specially suited to grass. There is no doubt that the soil and climate of Staffordshire are peculiarly suitable to its chief agricultural production, and are as essential to the

* The map illustrating this paper is reduced from the Greenough Geological Map of England and Wales, published by the Geological Society of London.—Edit.

making of good cheese as are the skill and the incessant labour and care which are also required. The dairy farmers, who have gradually increased their pasturage, frequently at the cost of lessening their returns until the new turf came into profit, have no doubt estimated accurately the economy of a process which has increased the permanent pasture of Staffordshire more than threefold, covering with grass 340,000 acres out of the 570,000 acres of its cultivated surface. The statistics show the immense and unparalleled advance of manufacturing and mining industry in North and South Staffordshire, accompanied by a rise of wages and occasional scarcity of labourers, which would have become inconvenient but for the extension of pasturage. There is, however, a limit to this extension, which in most farms has already been reached, while in many others a slight change in the relative value of agricultural produce would occasion the breaking up of inferior grass.

Dairy Farms.

Dairying, or cheese-farming, is carried on more or less in almost every part of Staffordshire. It is the mainstay of its farming, except on the small extent of land which is too light for grass, and it is pursued even on the tops of the hills which are too lofty for wheat-growing and too exposed for the growth of trees, or for ordinary cultivation. First-rate pasture land is worth 80*l.* or 90*l.* an acre, and the same land, in arable, would be worth only 50*l.* or 60*l.*

The cows were originally the large coarse description of shorthorns with yellow skins, great rough tails, and ragged appearance at the quarter where that appendage is set on. They have been greatly improved by crossing with the improved breeds. Many of the herds boast a large mixture of pedigree blood, which has had the usual effect on the quality and appearance of the animals; and occasionally the effects of too much "breed" have obliged the dairy farmers to retrace their steps, or at all events to weed out animals that show a greater fitness for the shambles than the dairy. As a rule, pedigree and pail are opposed, but the half-bred cows, properly selected, are very good milkers, and "blood" adds 5*l.* to their value when they are turned out to fatten. The demand for improved half-bred bulls is supplied by local breeders, who resort to the pedigree herds, and frequently give high prices for pure-bred males. There is a good demand for bull calves out of dairy cows with short pedigrees at 5*l.* to 10 guineas each. By such means the improvement of the breed of dairy cattle has been gradually advanced, and will doubtless be carried still further. The

famous long-horn, once the pride of the midland counties, is almost extinct. At the county show the number of animals exhibited dwindled till they were not worth the amount of the prizes offered, and the class was therefore discontinued. There are few remaining specimens; the only representatives I met with were at Fradley and at Thorpe Hall, where there are four or five survivors of a herd formerly noted.

Dairy farmers breed their own stock and keep up their herds by drafting in the young animals in succession. They sell all old, barren, or draft cows in the autumn clearing fairs. In ordinary seasons, when the root-crop is good, these cast cows, in fair order, fetch about 14*l.*, to fatten in other districts, where provender is abundant; and it is more profitable to sell than to finish them at home. But on farms where the quantity of ploughed land is considerable, or where there is some good feeding turf, the practice is different. Cows from a superior dairy are brought to market sufficiently fat for summer beef about July, and in late years they have sold at 24*l.* or 25*l.* Heavy high-bred cows are seldom sacrificed in this way, their owners preferring to keep them on till December, when the little mountain of beef, called by courtesy a *heifer*, is generally worth 40*l.* or 45*l.* Cast cows, condemned to become beef on next summer's pasture, are wintered moderately on about 3 lbs. to 5 lbs. of cake, with roots and "chop" (straw chaff), and in the neighbourhood of Burton-on-Trent three-quarters of a bushel of grains instead of roots, which are reserved for the milking-stock. Store animals are wintered on "chop" and roots (or grains), and are turned out to grass hardy, and with the rough hair of their coats unshed.

Milking-cows are tied up in sheds during the winter months, from November till early in May, when the grass-fields are again ready for them. A dairy farmer regards his ploughed land as merely subordinate to the requirements of the dairy—yielding food and litter for the winter months. By tying the cows in sheds, one-half the litter that would be required in open yards is saved. In the neighbourhood of Burton, spent hops are used for litter, at 3*s.* 4*d.* a ton. Hops absorb the urine, and are fit for immediate use; they have the best effect when applied fresh. The long straw from horse stables is picked over for littering calves.

Large herds—fifty or sixty—should be divided into two lots, as they do better and do not trample the pastures so much on coming up to be milked; a weak cow is less driven, and the danger of infection reduced. The usual time of calving is early in April; for breeding purposes February would be preferred, as early calves get strong, and are more easily wintered; but April is the period most desirable on cheese-farms, because the cows are then in full profit at the best time of year, when the best

cheese is made, and when the natural supply of food is greatest. Cows receive no artificial food during the summer, except in bad seasons, when the best farmers allow cake. In large dairies, where there must always be a certain number of cows that calve irregularly, the process of cheese-making is continued all the year, but superior cheese can only be made on grass. A first-rate cow will yield 14*l.* worth of cheese, at 60*s.* a cwt. of 120 lbs., and the year's produce of the cow will be:—

	£.	*s.*	*d.*
Cheese	14	0	0
Whey butter	2	0	0
Calf	1	0	0
Whey for pigs	1	10	0
	18	10	0

Cheese-making is occasionally continued all the year round; but in general the winter's milk is disposed of by suckling or butter-making. An eminent cheese-farmer informs me that his average price in the past ten years has been 74*s.* per 120 lbs.; his highest and lowest prices of the year's make have been 80*s.* in 1866 and 1868, and 65*s.* in 1861. His average yield of cheese in the same period has been 2 cwts. (120 lbs.) per acre of land summer-grazed, and 4 cwts. per cow. The sales are made three times a year—in August, November, and April. Cheese loses weight rapidly.

Another farmer, who makes cheese all through the winter, gives 4½ cwts. per cow as his average. The average yield of wheat on these two farms is rather under 4 qrs. per acre. Cows are not generally milked for ten or twelve weeks previous to calving.

The best cheese from regular good pasture is made after the middle of May. The common size of cheeses is from four to six to the cwt. of 120 lbs.; the large cheeses of 50 lbs. to 150 lbs. are made chiefly on the Cheshire side of the county. The size is to a great extent a matter of fancy and custom on the part of masters and servants; at the same time cheese on strong soils is liable to "heave" (ferment) during the process of drying, and in some cases it is considered necessary to remove a portion of cream, instead of using "whole" milk. The flavour of cheese is affected by artificial food. Over-stocking is a temptation and a mistake, which has given occasion to a saying, "If you want more milk, sell a cow!"

The only stock allowed to pasture with the cows are a few horses; they eat close, and are not objectionable. Sheep feed with the young stock on the inferior pastures, and should never mix with the dairy. One ewe, with her progeny, to three acres of grass is considered a sufficient stock of sheep. Ewes wintered on the best system are fed on hay and straw chaff, malt-dust, oats,

&c., and run on the store pastures in the daytime; the dry food keeps them in health, and is necessary to their well-doing even when grass is plentiful. On rich land, near Burton, where grains for winter-feeding can easily be obtained, a liberal feeding is practised; the head of stock kept on a farm of 120 acres of arable and 180 of good grass is as follows, during the summer:—

50 cows;
20 two-year-old heifers, to calve next spring;
20 yearlings;
20 calves;
60 ewes.

About 27 acres of hay are mown. Mr. Meakin, the tenant, fattens his cast cows in July and August, giving them cake on the pastures. During the drought of last summer all his neat stock had about three-quarters of a bushel of grains a day. For the year ending 5th April, 1869, his outlay on food was 500*l.* The price of grains varies, 2*d.*, 3*d.* and 4*d.* to even 7*d.* per bushel, according to demand and season.

The usual system of wintering young stock is to give them one bushel of mangold a day, with straw-chaff and no corn. This food is said to *come off the farm.* But on the heavier clays meal is cheaper than roots. On the poor heavy clays, worth only 20*s.* an acre to rent, bare fallow is considered a safe and inexpensive system. On such land a common rotation is—

Bare fallow;
Wheat;
Seeds for two or three years;
Wheat or oats.

Or tares are eaten off on the fallow, or removed for horses, cows, and pigs.

The strong-land farmer, on *good subsoils*, begins the fallow with a 10-inch furrow before winter with three or four horses. As the horse and manual labour on dairy farms can be concentrated, when desired, on the limited extent of ploughed land, a rotation of crops need not be adhered to so carefully as on arable farms, where a little irregularity disturbs the adjustment of labour; the cropping is often very irregular and severe. Good deep marls, into which the plough may go any depth without change in the character of the soil turned up, may, with good treatment, be cropped successively with corn, without apparent exhaustion. Deep-ploughing is then essential, and helps to prevent corn from becoming laid. Heavy clays, with inferior subsoils, are seldom ploughed more than 6 inches deep. The first ploughing is given in spring. Three ploughings follow during the summer: it is considered necessary to plough very heavy land five times. The

width of the *lands* is 9 feet to 12 feet; these are drilled at one bout, and in some instances the wheat is sown and ploughed in. Two bushels is a common seeding for fallow wheat. The fallows are seldom touched with the harrow till the time of wheat-sowing. When roots are grown, the heavy-land farmer ploughs in autumn, having first broadshared the land and made every effort to clean it.

Seeds, after lying several years, are often followed by oats, wheat, beans, wheat; or fallow is followed by wheat, barley, beans, wheat. Stubbles, to be followed by spring corn, are ploughed early in autumn, worked and cleaned, dunged and ploughed again late in winter or in spring. Wheat after oats is dressed with 3 tons to 4 tons of lime, which costs 10*s.* 6*d.* per ton at the kiln. Lime is applied on fallows in April and May previous to sowing turnips, or in the autumn after tares, or on seeds previous to sowing wheat. The usual dressing is 3 to 5 tons. The universal use of lime may be partly attributed to the necessity of a corrective after several years' seeds. It acts as a medicine, not as a manure; it checks slugs, and prevents club in cabbages. Land is found to lie better for wheat on the 9-foot ridges than on the flat, however well the land is drained and tilled. When wheat follows oats, the stubble is broadshared—the land cleaned before ploughing; a three years' lea followed by wheat receives a half-fallow, and should be ploughed before Midsummer, in which case an outgoing tenant is entitled to two-thirds of the crop of wheat, as in the case of bare fallow.

With a good seedsman, corn is often sown broadcast by choice. Horse-hoeing corn is not practised. Seven quarters of oats are a large crop, only obtained when artificial manure is used, and perhaps the general average does not exceed five quarters. Many farmers look too much to their cheese for profit, and to their corn-crops as merely supplying food and litter for cows.

Leas are ploughed once only for oats. In case of an old lea, the land is ploughed about Christmas, so that it may settle and the grass rot; a one-year-old lea is ploughed and sown as wanted.

The principal root-crops are swedes and mangold. They are cleaned and hoed by the milkers and odd hands, working by the day. The scarifier used in spring is usually drawn by four horses, walking in the furrows.

The cultivation of the cabbage is greatly extending. It comes into use when other things begin to fail, and it is by far the best succulent vegetable for milking-cows—keeping up the yield of milk, and preserving better than any other food some portion of the quality which cheese loses when the cows quit their natural pasturage. Cows fed on cabbages are always quiet and satisfied,

while on turnips they often scour and are restless. Cabbages are given whole on the pastures, and later in the season are either pulped or placed in the trough whole. When frosted, they are liable to produce hoven, unless kept in a warm shed to thaw before being used; 56 lbs. given at two meals are as much as a large cow should have in a day. Frequent cases of abortion are caused by an over-supply of green food. Cabbages are excellent for young animals, keeping them in health and preventing "black leg." A calf of seven months may have 20 lbs. a day.

The seeds, sown in corn to lie three years, are a mixture, costing about 28*s.* an acre, and containing some of the perennial grasses as well as the clovers. For permanent pasture, sown in June without a crop, after spring fallow and 3 tons of lime, the seeds used are one quarter per acre of purchased Yorkshire hay-seeds, to which are added about 6 lbs. white clover, 3 lbs. alsike, 2 lbs. trefoil, 1 lb. cow-grass, 2 lbs. rib-grass, and 1 peck Italian rye-grass.

The application of bones to pastures, exhausted by years of depasturing with dairy cattle, has been generally resorted to, and in the case of worn-out cow pastures the effects upon the herbage have been marvellous. They are not found to answer on dry light land, but they seldom fail on the moister heavier soils which have been underdrained; 3 or 4 cwts. per acre are applied, and occasionally heavier dressings for more permanent improvement. Rough pastures are greatly improved by grazing them close with ewes in winter when they are receiving dry food. By giving grazing animals corn, the herbage is gradually improved and made to yield good crops of hay. Old turf-fields of poor cold wet clay, producing but little grass, and that of an inferior description, may by this means, after draining, be made to yield sweet grass, thick at bottom and full of good herbage.

In the narratives which follow I have endeavoured to describe the systems followed on two well managed dairy farms.

Mr. W. T. Carrington, of Hollington, near Uttoxeter, is the author of the Staffordshire Agricultural Society's prize essay "On the most Scientific and Practical Mode of producing Cheese profitably in the Counties of Stafford and Derby," 1860, and of an excellent practical paper "On Dairy Farming" (see this Journal, vol. i., 2nd series, part ii.). I found in riding over Mr. Carrington's farm that he has practised very successfully what he has described very clearly. On one portion of his occupation, consisting of 180 acres of poor clay land, he has drained, at his own expense, during the last six years, upwards of 60 acres of arable and pasture land, 4 feet deep, ten yards apart, at a cost of about 5*l.* per acre. By this means and by liberally top-dressing the poor pastures (when drained) with bones and guano, and by the con-

sumption of a considerable amount of purchased cake, &c., the dairy produce of the farm has been greatly increased, and the appearance and quality of the herbage have greatly changed. As, however, his entire occupation of more than 300 acres is rather widely scattered, I prefer to accede to his desire and describe more in detail the adjoining farm, occupied by his father, Mr. John Carrington.

Croxden Abbey Farm is one amongst many equally satisfactory examples of farms held in this county without a lease, and kept in the highest state of cultivation, perfect confidence and a thoroughly good understanding subsisting between landlord and tenant. Lord Macclesfield is the landlord. The farm is thus divided:—

	Acres.
Plough land	60
Young turf	50
Old turf	140
Water meadow	24
Meadow	36
Total	310

The arable land is cropped as follows:—

1st year, swedes and cabbages.
2nd year, wheat or oats.
3rd year, seeds.
4th year, seeds.
5th year, wheat (or oats).
6th year, oats (or wheat).

Five horses are kept.

The cultivation must be briefly described:—1st. Fallow crops. The stubbles are scarified if the weather permits, and if their state requires it; if quite clean, they are ploughed 7 or 8 inches deep early in the autumn, in lands 4 yards wide. In spring the land is ploughed back, cultivated across with four horses, and then cultivated the opposite way. Being clean, the land requires very little harrowing, which would be objectionable, making the surface too fine and liable to run together in wet weather. After applying the dung for cabbages, the land is ploughed in wide lands, the artificial manure harrowed in, and the plants set with a line and spade 1 yard apart. For swedes the third ploughing is followed up every day with the Norwegian harrow, bringing the surface fine, and the land is immediately ridged up 27 inches apart. The operations must be done with expedition; and without careful management the work of obtaining a good tilth may be undone in fickle weather. About 15 tons of dung per acre are spread in the drills and 3 cwts. of guano per acre sown on the top, and the ridges split down on the manure with a double-breasted

plough; 5 cwts. of guano are used when no dung is to be given, but, as the whole of the roots are drawn off, dung is given if possible. The drill, with a sliding axle and a roller attached to the front part of it, is drawn by a pony, and takes two ridges at once; a small roll follows. The crop is sown with 4 lbs. per acre, from the middle to the end of May; 25 tons are a common crop. 20 tons of dung and 4 cwts. of guano per acre are used for cabbages; 40 tons are an occasional crop. Cabbage-seed (Robinson's Champion Drumhead) is sown about the 14th or 16th of August, pricked out in beds 4 inches apart in October and November, to make them stout and stocky; these are planted in the field in April and May, and come in during October and November. A succession crop, to follow up to Christmas, is sown on a warm border early in March and transplanted at once into the field in June, at 2 feet apart. This farm has the cool moist climate of a rather elevated situation in North Staffordshire. Barley cannot be grown, and mangold is surpassed in weight by other root-crops, which are superior both in quality and production. Swedes keep till April.

2nd. Wheat or oats drilled on 4-yard lands after the removal of the fallow crop.

3rd. Mixed seeds, which are dressed with artificial manure and sometimes boned. The first crop is mown for hay; the aftermath is fed.

4th. Seeds, fed invariably and broken up for wheat or oats. If for the former, the land is ploughed before Midsummer, then ploughed across, harrowed down, dressed with from 2 to 3 tons of lime per acre, and ploughed in 4-yard lands. A light dressing of artificial manure is applied in spring, if required; wheat sown after; one furrow would generally be worried by slugs. 2 bushels of seed per acre are drilled.

6th. Oats. The land is ploughed as soon as possible after harvest, and laid up deep and dry in 4-yard lands; in spring it is dragged down and sown without ploughing. This crop is not sown until after the second week in March, for fear of the land running together. Oats after seeds are sown a fortnight earlier, because the turf-furrow acts as a drain, and prevents the land becoming set. $2\frac{1}{2}$ cwts. of guano or 4 cwts. of prepared bone-manure are used for oats, following wheat. 5 or 6 bushels of seed are planted.

In some seasons the second-year seeds can ill be spared at Midsummer, and occasionally, as last year, the ground is so hard as to render it almost impossible to break the leas up at that time; in that case oats are taken instead of wheat after the seeds. The land is ploughed as soon as possible after Christmas, and the furrows pressed, and the earliest variety of oats is sown. As soon

as the land is cleared of the oat-crop, the stubble is broadshared twice, and the stubble and rubbish harrowed out, raked together with a horse-rake, and carted away to be trodden into manure by the pigs. A dressing of about 3 tons per acre of lime is then applied in a hot state, and the land drawn up in 4-yard ridges. It is sown with 2½ bushels per acre of wheat early in October. A light dressing of artificial manure is given, if necessary, in March or April.

Threshing, grinding, &c., are done by water-power.

The meadow-land is mown every year and dunged every second year. A good deal of cake, cabbage, and hay is also consumed upon the upland meadows in the winter by sheep and yearling calves, and occasional dressings of artificial manure are given in April upon those portions of the meadows which seem to require help. Slight dressings are sometimes given after the hay is off, in wet weather, at leisure times; the grass is cut by machine. Bones and artificial manures have been resorted to on the turf of this farm. In one instance 15 tons of boiled bones were purchased, sixteen years ago, at a cost of only *3l.* 12*s.* 6*d.* per ton. A portion of them was applied to a 7-acre field of poor, sour, hilly pasture, at the rate of 1 ton per acre, with wonderful effect; and though so long a period has elapsed, the improvement is still most marked, and the cattle show a decided preference for that field. Prepared bone-manure is now applied to the grass, and lasts longer than guano. Nitrate of soda is also found to be a useful grass-manure. The effect of all these applications and of a liberal system of stock-feeding, with a favourable soil and a cool moist climate, has been to produce a very beautiful turf. I have seldom seen grass that showed so plainly that it enjoys a suitable soil and good cultivation. The natural meadow clover or cow-grass (*Trifolium pratense perenne*) forms a considerable proportion of the rich herbage. Its rose-coloured blossoms quite paint the meadows before the grass is cut, and the abundance of this plant shows that the marl-soil contains, naturally and artificially, a good supply of lime. The grass seldom suffers in the hottest summer, though the summer of 1868 was a marked exception; and as Mr. Carrington never overstocks, no forage-grass is provided for the dairy, and no food is given until the grass begins to fail in autumn, when cabbages come in and last three months, up to Christmas. Swedes, turnips, and uncut straw are then given up to March, or until the cows are near calving, and 5 lbs. of crushed oats or 4 lbs. of oil-cake are then given daily, with abundance of good hay, until the grass comes.

The stock kept consists of 50 cows, in milk, 14 two-year-old heifers, 14 yearlings, 14 calves, and a bull; 70 Shropshire or Leicester ewes, and their progeny; and pigs to eat the whey, fed

on meal, and producing about 200 scores of bacon each year. The breeding-ewes are wintered on the grass-lands, having hay supplied to them when the weather is severe, and a moderate allowance of swedes when within a month of lambing. The lambs drop about the 1st of April. Wethers run on the upland meadows and pastures all the winter without roots; before Christmas they begin to receive 1 lb. of cake a day each, with hay. They go off fat in June or July; the culled ewe teggs go off a little later. The ewes are drafted at four years old. The cows calve in March and April; fourteen or fifteen young cows are brought into the herd every year, and the same number of cows sold in spring or autumn. This is essentially a dairy, not a feeding, farm. Cheese of moderate size is made, weighing 30 lbs. each; it is slightly coloured with annatto, to suit the wishes of buyers.

Mr. Archer, of Castle Hays,* near Tutbury, allows me to give a detailed description of his management on a dairy farm of 440 acres, belonging to the Duchy of Lancaster. The soil and aspect of this farm are varied. On one side are "the Banks," and beneath is the rich valley of the Dove. A steep declivity leads down to the boundary of the farm and to pastures beyond, worth 60*s.* an acre. These slopes and several adjoining fields, more picturesque than practicable for the plough, are in turf. During his twelve years' occupation of the farm, Mr. Archer has increased the permanent pasture by 104 acres, leaving in arable only 146 acres. This is a good red marl, on a subsoil of the same, and with deep ploughing and liberal feeding it bears a severe course of cropping. The usual breadth of roots is about ten acres of mangold, four or five of cabbages, and four of swedes. Eight acres of tares are also sown in five successional crops, and they play an important part in the night-foddering of the cows, whenever grass falls short any time between May and the coming in of cabbage in September. The best and earliest pastures are on the marl, and the gypsum rock which is found in that deposit, and is worked in one of the high pastures; but a considerable portion of the grass is on pale clay, comparatively poor, and so close in texture that in draining it the regulation depth of 4 feet was less successful than shallower drainage at narrower widths would have been.

I shall describe the management on this farm in some detail, giving statistics which will show the expenses and returns on a dairy farm not uniformly of good quality, but where unceasing

* "Castle-hay Park, situate within a mile of the Castle (Tutbury), 749 acres, whereof meadow 12 acres, the rest good pasture; for the most part shadowed with oak-trees, to the number of 550, whereof in young oaks 400, the rest, for the most part, old dotard oaks: it may well bear 480 deare." (Survey in the first year of Queen Elizabeth.)

personal industry and attention to details, together with judicious expenditure, have, I hope, been rewarded. It is better to take for description a fair representative farm rather than a model or example farm, especially as models are not always practically serviceable, and example farms are sometimes examples that ought to be avoided.

The live stock on the 20th May consisted of—

<table>
<tr><td>61</td><td>dairy cows.</td><td></td></tr>
<tr><td>9</td><td>barren cows, in process of fattening.</td><td></td></tr>
<tr><td>2</td><td>bulls.</td><td></td></tr>
<tr><td>17</td><td>"stirks," to go to the bull about July.</td><td rowspan="3">These are all bred on the farm, and will be drafted in succession into the dairy herd.</td></tr>
<tr><td>20</td><td>yearling heifers.</td></tr>
<tr><td>16</td><td>calves, born this spring.</td></tr>
<tr><td>120</td><td>Shropshire ewes.</td><td></td></tr>
<tr><td>185</td><td>lambs.</td><td></td></tr>
<tr><td>92</td><td>hoggets.</td><td></td></tr>
<tr><td>19</td><td>feeding sheep.</td><td></td></tr>
<tr><td>33</td><td>feeding pigs.</td><td></td></tr>
<tr><td>5</td><td>sows and their young.</td><td></td></tr>
</table>

A glance at this list shows that the system is to fatten off every year a certain number of cows and ewes, which for some reason are not to be retained, and to bring in others which were bred on the farm to supply their place. By this means the risk of purchasing animals at markets is avoided. Bull calves are sold as they drop.

The crop of lambs is usually one and a half per ewe. The first year of keeping Shropshires on this farm 42 ewes had 80 lambs, and reared all but two.

The cows are tied up in sheds at the commencement of wet weather in autumn—say, November 1st. For the first month they are let out every day from 8 A.M. till 4 P.M., getting cabbages, swedes, &c., in the pastures. The whole of the mangold tops are used in this way. To counteract the laxative effect of this succulent food, two feedings of wheat, straw-chaff, and grains are given. About the 1st December the cows are tied up entirely, except half an hour's exercise twice a day. They are then fed principally on "mixture," which will be described. The hours of feeding, &c., are as follows:—

5 A.M. Mixture.
7 ,, Uncut straw.
9 ,, Turned out to water and exercise for half an hour, during which time the sheds are cleansed and bedded; then tied up. Mixture.
12 o'clock. Mixture.
3 P.M. Turned out for half an hour, and then tied up to mixture, which they eat in half an hour, and then lie down.

5 to 6 P.M. Racked up with long straw for the night.

In winter the cows are milked at 6.30 A.M. and 5.30 P.M.

The "mixture" consists of cut straw, pulped roots, grains, and pressed yeast, mixed together in a damp state, and fermented in a heap; it improves up to about 20 hours, after which it would become too dry from excessive heat and consequent evaporation. As the winter advances, and the cows get nearer calving and require more support, the quality of the "mixture" is improved. The whole herd of 130 head, when first tied up entirely, eat daily, per head, 2 bushels of straw-chaff, 13 lbs. of roots, 15 lbs. of grains, and $1\frac{1}{4}$ lb. of yeast; in spring, ground oats, Indian corn, or rice meal takes the place of grains, the supply of which falls off as the brewing season at Burton comes to a close, towards the end of March. The food is improved so as to ensure having the cow in good condition, and therefore in good profit, at the time of calving. Hay is always given, instead of straw, three weeks previously.

All sweet wheat-straw, not required for bedding, is cut into chaff; the two fodderings of uncut straw, given to promote digestion and chewing of the cud, are of oat and barley straw or pea haulm.

Calves are never allowed to suck; they have new milk, and nothing else, for three or four weeks. The quality is then reduced, and wheat-flour, gruel, and dissolved linseed-cake are added; the milk is reduced up to six or seven weeks old, when it is discontinued entirely; the wheat and linseed porridge is given till about nine or ten weeks old, according to size and strength, and the calf then finds its own living in the best pastures, without help. Calves dropped in February are turned into small enclosures in April with a shed to run into, an indulgence which lasts only a few weeks. The young animals are removed into yards in good time in autumn, by the end of October, in average seasons. If allowed to continue in the pastures too long, they are exceedingly liable to "black leg," an inflammatory affection which attacks the strongest and most growing calves, and is locally called "speed," from the rapidity of the attack and its fatal result, within 24 hours. During the first winter the calves get 1 lb. of linseed-cake daily, in addition to the mixture; a little salt is added as a preventive of the fatal malady referred to, with an occasional dose of 1 oz. of saltpetre, black antimony, resin, and sulphur, mixed in equal proportions. The mixture is made rather better for the calves than for cows; they get two fodderings of oat-straw a day, and this diet is continued till the pastures are ready in May. The second winter they have three fodderings of straw and a mixture rather inferior to that of the milking-cows. The third winter, being in calf, they are fed

the same as the cows, and a little oilcake given to the weaker ones.

The rotation of crops is irregular, the following is an approximation :—

1. Fallow, swedes, mangold, cabbage.
2. Barley.
3. Seeds, manured in winter and mowed (the mixture of seeds costs 28*s.* an acre).
4. Ditto, pastured with cows (sheep would destroy the best growth).
5. Ditto (if doing well), pastured; ploughed once in February for
6. Oats; ploughed at harvest, cultivated, limed, or dunged, ploughed and drilled with
7. Wheat; dunged for
8. Beans, ploughed, cultivated, and cleaned.
9. Wheat.

The fallow is carefully and economically made; 4 horses, a man and lad plough 2 acres a day with a double plough, the land is then cultivated and picked, and ploughed 10 inches deep at least, before winter. This completes the ploughing. In spring the land is cultivated twice, harrowed, and rolled, and dunged on the flat. The artificial manure is then sown and the double-breasted plough, in making a ridge, turns in the whole. The deep autumn ploughing is essential to the practice described, and it is also essential to the severe cropping, which could not be maintained without good feeding and deep cultivation; but then the subsoil is marl, and as good as the top soil.

A dead fallow is taken every 12 years, and, instead of dung, 4 tons per acre of quicklime are used, which produces more corn and less straw; seeds, sown in wheat, after liming, never miss. 2 cwts. of guano are used for oats, if after corn; prepared bone-manure is preferred to guano for all corn-crops, if corn is to follow, because it is not all expended in the first crop; 3 cwts. per acre (at 8*s.*) are used for wheat after wheat.

Cabbages are always dunged heavily; this year they received 30 tons per acre of fresh manure taken from the cow-sheds, after using spent hops for litter.

Dung, or artificial manure, is always used for the hay-crop, and the 104 acres laid down have been top-dressed every other year; 5 cwts. of bone-dust, applied in February, is a favourite dressing for permanent pastures; and in May, this year, the change in the herbage of a four-year-old pasture, so treated last February, is very striking.

Hay is taken on 20 acres of seeds and 20 to 30 acres of meadow; the meadows are laid up by the 25th of March. The

best pastures are reserved for feeding, because one acre of good grass will make more cheese than two acres that are inferior. But the worst grass-land has been greatly improved by a variety of dressings, and especially by wintering the sheep on it. One old turf-field of cold wet clay-land, producing coarse grass, without clovers and bottom herbage, was drained five years ago, and by night-feeding in winter, and dressings of 2 cwts. of guano and 12 tons of dung in alternate years, it has been entirely changed. The herbage has become thickset and sweet, yielding a heavy swath even when its length is not great.

The use of salt, in improving sour grass, may be mentioned. A hill-side, where the cattle did not lie, became impoverished, and the grass got *fogged*, that is, rough and sour, so that it was not relished by the stock; and in winter the herbage was destroyed by the rotting of the uneaten grass. Under these circumstances half a ton of salt per acre was applied in February, and, after the apparent total destruction of the turf, a good wholesome herbage sprung up in about three months; of this the sheep and cattle so approved that they penned themselves upon it, and the land has pastured well ever since.

Mr. Archer finds that the best way of laying down a pasture is to fallow the land in spring, lime it, and sow in June, without a crop. The gorse-field of 16½ acres was so treated, and is now a fair pasture. It was formerly rented by the gentlemen of the hunt at 40*s.* an acre, and was a splendid gorse-covert 6 feet to 9 feet high. The gorse was first burnt as it stood; eight horses on a large plough, constructed for the purpose, turned up the soil, with the aid of men following to grub up the stoutest roots. After a summer fallow, the field was cultivated for a year or two. The first autumn permanent grass-seeds are eaten off by cows, if the season is dry, but in wet autumns this clay soil would be too tender to bear the lightest hoof, and must lie by till spring. The following summer the new turf is pastured by milking-cows, and they are kept out in wet weather. Sheep are carefully excluded for the first three years, on account of their eating out the best herbage. Dung is always applied the first winter, if the weather allows of cartage; if not, 2 cwts. of guano are substituted, followed up by dung in the following autumn.

The clay pastures are a month later than those on the marls.

The work of the farm is done by eight horses and a pony, and by seven labourers, besides four lads living in the house, three women who help in cutting chaff and threshing, besides field work, and a few extra hands in harvest. The occupier and his son, however, belong to the effective staff all the year round.*

* This report contains no detailed account of the process of cheese-making, because the subject, which requires an essay in itself, has already been well treated

Among the items in a long list of feeding and manuring substances used within the year, I find 4480 bushels of grains, 69 tons of spent hops for litter at 3*s.* 4*d.* per ton, 11 tons of pressed yeast, 6 tons of malt-dust, 5 tons of bone-dust, &c. The rent is 633*l.*, tithe 68*l.* to 78*l.*, rates 28*l.*; total 33*s.* 1½*d.* per acre.

The average produce per cow is 4½ cwts. of cheese at 65*s.*; the produce of store lambs, wool, and mutton, is 390*l.*, that of pigs 150*l.* clear.

Needwood Forest, now belonging almost entirely to the Duchy of Lancaster, was described in a survey of the first year of Queen Elizabeth's reign as lying in the four parishes of Tutbury, Hanbury, Tatenhill, and Yoxall. It was then "thinly set with old oaks and timber-trees, well replenished with coverts of underwood and thorns." In a report drawn up for Charles II. the area was estimated at 10,000 acres; the trees, many of which were of large dimensions, were stated to number 47,150, besides the hollies. Cromwell's proposal, in 1654, to sell the Forest had been petitioned against by the inhabitants of twenty-one villages and townships adjoining, on the ground that rights of pasture were enjoyed by a "great number of ancient cottagers, who do sustain themselves and their poor families by the relief of the said chase." Moreover, "the Forest of Needwood is merely formed by nature for pleasure, no forest in England being comparable thereto." The value, if improved, was estimated at 5*s.* an acre, and in the subsequent report at 10*s.* The Forest was divided into four wards and ten parks. The present lodges were occupied by the keepers; for instance, Thomas de Berkley, Baron of Berkley, in the county of Gloucester, was keeper of Tutbury Ward, and lived at Berkley Lodge. The best timber was around Eland Lodge, in Marchington Ward, where the famous "Swilcar Oak" now stands. Pitt estimated the value of the pasture as follows:—

3000 deer	1*s.* per acre.
3000 other stock at 12*s.* a head for summer keep	4*s.* „
Total	5*s.* per acre.

There were no sheep; the hollies which grew in such abundance were encouraged for the purpose of winter provender for the deer. Red deer abounded in the forest until it was enclosed in the first year or two of this century; they are now found in several neighbouring parks. Wild oxen are still preserved in a

in the Journal. The amount of in-door work entailed on the household would be appalling to families unaccustomed to it. It is usually performed by dairy-maids, wives, and daughters, as the case may be, and the latter undertake a large share of it.

wild state in Chartley Park, which was enclosed from the Forest by an ancestor of Lord Ferrers in the thirteenth century.

The romance of forest dell and wooded glade still clings around this spot, an incitement perhaps to the thought and feeling which should accompany the humblest toil. The greenwood shade has disappeared however; short-horns have succeeded the wild herds that roamed in Needwood Forest, and cheese-making has taken the place of less lawful pursuits. If we enlarge the boundaries of what is still called "the Forest," though no forest remains, and include Bagot's Park and the surrounding neighbourhood, we include about 25,000 acres of land which requires a brief notice, as the largest tract of cold heavy land in Staffordshire. Strong quick-hedges divide the square fields, and fence the straight roads laid out at the enclosure. Ancient thorns and hollies stand here and there, and great dotard oaks occasionally occupy the arable grounds. There are more cowslips, because more cold pastures, and more coltsfoot, because more poor damp arable, than I have ever seen. The oak thrives naturally, and at Bagot's Park, on pale lias-clay land, there is a large extent thickly and regularly planted with oaks of great size, which in their decay are a novel spectacle; the more so as in driving through the park there is nothing else to attract the eye over the level green sward, and no mansion remains.*

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* Mr. T. Pickering, Lord Bagot's agent, has kindly supplied me with the following notes on remarkable oak-trees in Bagot's Park:—

"The 'Squitch Oak' is the *largest* tree in Bagot's Park. As measured in 1823, this tree contained 1012 cubic feet; one limb alone measuring 79 cubic feet. The value at this date was estimated at 240*l.* 12*s.* Circumference at 5 feet from the ground, 21 feet 9 inches.

The 'King Tree,' when sound, was the *most valuable* tree in Bagot's Park.

	£.
In 1812 a Mr. Bullock offered for the first length (12*s.* per foot)	200
The market price of the residue, including bark at 14*l.* per ton, was estimated at	93
Value of the King Tree in 1812	293

T. Pickering sold the centre portion of a windfall oak from 'The Cliffs,' Bagot's Park, in 1863, for 48*l.*

The 'Beggars' Oak' is the *most picturesque* tree in Bagot's Park, and certainly one of the most picturesque trees in England.

Height to the crown	33 feet.
Height above crown	27 ,,
Height	60 ,,

The but and limbs, of which there are 14, contain upwards of 850 cubic feet of timber. The circumference of the but, immediately above the swell of the spurns, is 27 feet 3 inches; and at 5 feet high the circumference is 20 feet. The branches extend upwards of 50 feet from the but in every direction. The spurns, or roots, of the tree, which project above the surface of the ground for a considerable height, measure 68 feet in circumference.

The 'Venison Tree' is supposed to be the *oldest tree* in Bagot's Park, and in

Forty years ago, when no roots were grown on heavy land, the principle of cropping was to rest the land with two or three years' seeds, after which two corn crops could be got out of it. The rotation was—

Fallow;
Wheat;
Barley or oats;
Seeds for two or three years;
Oats;
Wheat.

Very little clover appeared in the second year's seeds, which consisted of perennial rye-grass, white clover, and trefoil; these were mown for hay, and the crop, though slight, furnished sufficient winter provender for the horses and a few cattle and sheep. A few cows were wintered in the straw-yards, and the principal sales of stock were made once a year at the great fair held at Barton-under-Needwood, and formerly noted for its large show of heifers. But the produce of "the Forest" is now exported in another form, and the famous fair is about to be discontinued. The four-field rotation of crops succeeded the old system, viz. fallow (bare), wheat or barley, seeds, wheat; but the loss of clover from its frequent repetition proved a serious drawback. As stock became dearer, roots began to be grown on the fallows, as well as tares for folding off and soiling; and all but the heaviest fallows are now generally cropped in this way. Another great change has taken place, with the special object of resting the land from clover and corn, and of increasing the green crops at the least possible expense. The old system of laying down the land in "seeds" for two or three years has been revived. The practice of laying the greater part of the dung on the seeds, and getting roots by means of artificial manures, is greatly extending. The red marls are singularly disposed to pasture; the best of them make excellent turf in five years, and though it takes fifteen years to make good turf on colder soils, even the poor clays of the Forest are better suited for grasses, under rotation, or permanent, than for anything else. Having regard, therefore, to present prices of produce, the cost of labour, the supply of manures, and the expenses of cultivation generally, it is probable that the present is the best mode of cultivating the Forest clays and others suited to pasturage. Two-thirds of the Forest are in grass, and the quantity has been greatly increased in the last ten years.

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existing records is shown to have been a tree of note upwards of 600 years ago. This makes it at least coeval with the Conquest; I am of opinion, however, that it dates much further back."

The Forest of Needwood consisted of patches of dense undergrowth, and occasional tracts which, in the American forests, are called "oak openings," where the trees stand thinly with pasturage underneath them. It is said that some of the best pasturage at the present time is that which has never been broken up, but merely improved by the removal of the wood. The ancient turf is a fortnight later in spring, and probably less productive, but it is generally preferred by grazing stock.

In the park of Yoxall Lodge is an excellent specimen of primitive pasture and of forest scenery surrounding the former residence of Mr. Thomas Gisborne, author of the articles on agriculture in the 'Quarterly Review.' An adjoining Forest farm was cultivated *à l'outrance* by his brother, T. M. Gisborne, who made the land temporarily fertile by heavy applications of Burton manure, and by high feeding. Subsequently, under bad treatment, the condition was not kept up, and the land has reverted to its original state. The fields now wear a sorry look; *black grass* has got possession of the corn, and the gorse and bramble reappear in the pastures.

The farming of this district does not differ in character from that described under the head of Dairy Farming, but, as usual, the worst farmers are on the worst land, and there is here a good deal of indifferent farming, and of land unimproved and insufficiently drained. There are also very many bright spots, one of which I am permitted to notice. It is the property of Mr. Willoughby Wood, of Holly Bank, whose exceptional management has altered the natural surface of his domain, and has almost banished the cowslip and the coltsfoot.

Mr. Wood's farm consists of 200 acres, 60 acres of which are under the plough. There are 100 ewes and 20 dairy cows, some of which are pure-bred shorthorns; 50 or 60 head of cattle, of all ages, are wintered. A system of high feeding, with cake, &c., is pursued in the winter months.

The Light-Land District.

Light-land farming, with turnip and barley cultivation, is well represented on several important estates in the neighbourhood of Stafford. During my journeys I called on Mr. Harvey Wyatt, of Acton Hill, who is agent to Lord Lichfield, and who has been engaged in land agency and agriculture from the time he was an agricultural pupil under Mr. Blaikie, the celebrated agent of the late Lord Leicester. Mr. Wyatt wished to show me a district principally of light land, where the farming is, as he said, as good as in any part of England. For this purpose we drove through a portion of Lord Hatherton's estate in the parish of Penkridge; a part

of Lord Lichfield's estate in Dunston, Acton Trussell, Walton, Baswich, Shugborough, and Haywood; a part of Lord Shrewsbury's estate in Tixall, Ingestre, St. Thomas, and Weston, and up to and including some of Lord Harrowby's estate in Sandon, and two farms belonging to Mr. Twigg and Mr. Grindley. This agricultural district, extending about eleven miles, shows very superior management. The stock is good, and the Shropshire sheep the best of the breed. The tenants' houses and the farm-buildings are sufficient and substantial, and some of them are admirable. Brancott, a farm of about 500 acres, was a remarkable example-farm, under the tenancy of Mr. Hartshorn, who, with the encouragement of the late Lord Shrewsbury, then Lord Ingestre, and the son of Lord Talbot, the great agriculturist, made it a place of note and general resort before the great levelling up in the agriculture of the country, which has deprived Brancott, and other noted farms, of their eminence.

This central part of the county is the best part of it for general agriculture and for residence. The soil on the sandstone is generally good sound corn-land, and, when of good depth, it is often exceedingly productive. The red-sandstone rock is not a good subsoil for pasturage, but it is good for everything else. It is not so rich as the fat marls, but the surface is drier, warmer, more broken, and picturesque, and better covered with timber and natural vegetation in hedge, wood, and lane. From this central district a tract of light land, of varying fertility, and sometimes consisting of a poor gravel-drift, extends in a south-eastern direction through Rugeley and Lichfield to Tamworth; and a narrower strip extends from Sandon northwards, through Stone and Swinnerton, to Trentham and Tittensor; southwards it extends, with little interruption, from Teddesley, through Penkridge, to Wolverhampton, and thence to Stourbridge and Enville. The light land seldom crosses the Trent, which is, with few exceptions, its eastern boundary. The rivers Penk, Sow, and Trent, with many streams and brooks rising in the hills of Cannock Chase, water the district and enrich the meadows on their banks; otherwise there is far more arable than pasture land.

These natural advantages—the rich land, the wood and plantation, the undulating ground, with the wild, elevated tract of Cannock Chase, in the centre of the district—are shared almost entirely, so far as the possession of the soil goes, between several great estates owned by noblemen.

Perhaps nowhere in England have the example and patronage of the great proprietors had a greater and more beneficial influence on agriculture than in the case of the great Staffordshire landowners, whose estates—comprising more than 100,000 acres

of the finest land in this county—are all adjoining, with the exception of Trentham, which is separated by a single wedge of rich land, at Swinnerton, belonging to a commoner.

On several of the larger properties the agency of the estate has descended in the same family as regularly as the estate has passed to its heirs; and, in consequence of the prevailing principle, many of the tenants, though only yearly holders, have handed down their occupations from father to son for several generations. In some instances the land is farmed by widows or minors, and sometimes an undesirable tenant holds on year after year; so strong is the reluctance to disturb the occupation. The spirit of forbearance exercised by the possessors of so much power reminds one of Edward the Confessor's "I cannot hurt you!" an exclamation which the king used, in the hunting field, when he was checked by a clown, whose "notice to quit" would have been summary if the monarch had been less amiable.

In the light-land district the four-course rotation, common on turnip-land, is now very generally varied as follows:—

1. Turnips;
2. Barley;
3. Seeds;
4. Ditto;
5. Oats;
6. Wheat.

This has the effect of throwing both turnips and clover further apart, which is in many cases desirable, from the liability to clover-sickness, and to anbury in turnips.

The practice of growing turnips with artificial manure, and saving the dung for seeds, is fast gaining ground. The leisure time which succeeds the turnip season in June is chosen for this manuring, and the seeds are first eaten close; they soon push through the manure, and absorb it. Italian rye-grass is used with the clovers, and in almost all cases for the sake of the early feed, which is so useful where a breeding flock is almost always kept. On light soils, somewhat poor for wheat, the pasturing of seeds exhausts the land, and it must always be changed afterwards; in some instances, especially when a dry flock is preferred, the seeds are made into hay; but this, though a better preparation for wheat, is a practice not in accordance with general economy, and is becoming exceptional. On such land the acreage of wheat is generally reduced, and oats are substituted. Rib-grass, which is common throughout this county where seeds are grazed, is not approved for hay; it causes the stack to heat, and, by spreading out its leaves horizontally, it occupies space out of proportion to the produce.

There are various methods of treating fallows: one is to give a deep ploughing of about 10 inches in autumn, after cultivating the stubble, followed in spring by cultivation without ploughing. Roots are always grown on the ridge, and the artificial manure and dung, when given, are sown in the drills, which are then split, rolled, and drilled, with a combined two-row machine. A simpler mode, when the land is clean, is to sow the artificial manure on the flat, and then form the ridges with the double-mould-board plough. This saves one operation. The advantage of avoiding spring ploughing has often been discussed. I shall only remark that the practice is extending, and that the essential points are, first, to free the land from thistles and deep-rooted weeds, and to commence with a deep ploughing in autumn. On land of less depth, shallower ploughing is adopted.

When the sandstone rock lies below and too near the surface, the fallows are ploughed 3 inches or 4 inches deep up to Christmas; they are worked by grubbers in spring, then ploughed 5 inches deep, and drawn out for the manures. This warm land is "given to weeds," and, except after extraordinarily clean farming long pursued, a crop of seeds is turned up by deeper ploughing sufficient to smother the growing crop. This is occasionally given as a reason for not ploughing deep; it seems a very bad one, but the truth is, the bone is sometimes covered by a thin slice of meat, and when an animal is poor by nature, he takes a great deal of feeding. This perhaps may illustrate the philosophy of shallow ploughing on chalks, thin gravels, and sandstone rocks.

Autumn cultivation is best commenced with the plough; for broadsharing in autumn, however desirable in certain cases, is not essential on clean land. The broadshare is a tool which repairs previous neglect. A good manager casts it aside, and ploughs up his clean stubble at once, instead of wasting time in scratching the surface. In the case of land very foul with couch, broadsharing is the best mode that can be devised for killing a portion and dividing and planting the rest in small bits all over the ground. If, however, weeds have seeded in the corn, the seed can be started at once by cultivating 2 or 3 inches deep. The ridges for turnips are made 24 to 27 inches apart. Swedes are sown from about the 19th of May, and sowing is continued up to the 20th of June.

Prepared bone-manures, guano, and the usual artificials, are largely used for roots; guano and nitrate of soda are frequently sown in spring as top-dressing for wheat, oats, and barley. Lime is in general use here, as in all parts of Staffordshire. It is not applied here so frequently as on heavy land, but is applied on turnip-land at least once in twelve years in doses of 3 or 4 tons per

acre. It is a preventive of anbury; seeds are improved by it, the sample of wheat is brighter, and the straw stiffer. On land depastured several years, it destroys grubs. After folding one-half, or two-thirds, of the ground, the land is ploughed once and reduced to a fine tilth for barley, which is sown at least a fortnight later than in the eastern counties. The bulk is sown in April instead of in March; the best farmers prefer to sow between 20th March and 10th April. Barley is liable to be injured by the north-east winds if sown earlier in this climate. The quantity of seed-wheat sown is larger than in the corn districts just named; 5 to 6 pecks, which would be considered amply sufficient during the first ten days in October, is thought here to be very thin seeding; and later in the season the quantity sown is 8 to 10 and 11 pecks.* Wheat is seldom sown before the middle of October on the light land, which ought to be well moistened first by rains.

The reader will remember that the new red sandstone formation comprises marls, elsewhere described; sandstone rock, sometimes coming to the surface, sometimes covered with a deep rich soil; and beds of gravel-drift, which seldom make rich land, and are frequently covered with very thin poor soil. In this district there are sandstones and gravels as a rule, and marl beds as an exception. There are transition soils, which are sometimes fertile, and sometimes apparently consist of the worst ingredients washed from distant strata—poor yellow clays mixed with stones, poor gravels, and weak brashy soils that require very high feeding. These soils are far from productive, but with high farming they generally produce good seeds and turnips, and carry some good flocks of Shropshire sheep. With such a great variety of soils, the details of management must vary very much, but the general system has been given, and further details of local practices may be gathered from the following account of a farm on Lord Hatherton's estate, which was enclosed from Cannock Chase in 1820.

Mr. C. R. Keeling, of Yew-Tree Farm, near Penkridge, is a well-known breeder of Shropshire sheep. His farm consists of 360 acres, 60 acres of which are very inferior turf. It is a poor light soil, full of large and small pebbles, which are thickly sown over the surface. The land was exceedingly wet, owing to percolation of the water from the higher level of the Chase, and its retention in "pockets" by pans of conglomerate lying sometimes near the surface, and spreading over the farm in wide patches. It was drained 3 feet deep, 8 and 10 yards apart. Gravel, sand, iron, and black pebbles make a soil which must

* The Staffordshire bushel holds 38 quarts.

be constantly fed with manure, and this is managed on a four-course rotation in the following system. The root-crops are well dressed with artificial manures and bones, and they get all the farmyard dung except what is reserved for tares, which should always be dunged, and for seeds; the best barley is grown after dung. The seeds are the mainstay of the flock during summer. Eight acres of vetches are sown in succession for the flock; turnips follow afterwards. About one-half of the swedes are carted to the yards, and with these and the mangolds and a large quantity of straw-chaff and corn, 30 or 40 head of horned stock are fattened.

Rye is grown as an occasional "snatch crop," to be eaten off by the yearling cattle, with pulped mangold, chaff, and malt-dust. The mangold headlands and any spare corners are sown with rape, to be mown for the sheep.

About 500 sheep of all ages are summered, viz. 160 ewes, their lambs averaging 240, and the rams, wethers, and yearling ewes, saved for succession and sale. At the annual sale, 80 to 100 drafted ewes and 40 rams are disposed of.

Having noticed the live stock, the system of maintenance, the disposal of the manure, and the constant feeding the land receives, I will add a few other details to describe the quality of the land and the general management. Oats are frequently substituted for wheat as the fourth crop, being frequently more profitable on a thin soil; 50 acres of the latter are the usual breadth instead of 75 acres. The furrow is pressed for wheat. Frequently the flock is helped with two years' green crop (vetches) instead of wheat, or a field of seeds stands two or even three years. In that case it is always fed, and the land is manured with farmyard dung for oats. The breadth of seeds is 70 acres, of which from 15 to 20 acres are mown for hay.

Tares are mown and placed between hurdles for the sheep to pull through. Three or four acres of cabbages are grown for change of food. "Rib" has been found to have but little feeding value, and has been discontinued in the mixture of seeds, which consists of 1 bushel of Italian rye-grass and 12 lbs. of mixed clovers—white, red, alsike, and trefoil. Red and white clovers are sown alternately so as to be grown only once upon the same land in eight years. For two or three years' seeds the white is increased; and for early feed, 2 bushels of Italian rye-grass per acre are used, as it comes quick when sown thickly. If the dung can be got on for swedes in winter, the ridges are then drawn 5 inches closer (22 inches), and that is a gain on this land. Fallows are ploughed 6 inches deep in autumn; deep cultivation is useless on this lean soil; subsoiling, which is so

beneficial in the case of fat subsoil, has been tried without any advantage.

The seeds are generally good, and will "summer" three ewes and their progeny, or five dry sheep, per acre. This year they are bad, but the season was favourable to growth, and on the 8th of June I saw 80 ewes and 150 lambs on a 45-acre field, and 60 ewes with one lamb each on 22 acres, and neither had had a change, or any other food but the seeds, since lambing time in April. The sheep looked exceedingly well. I must notice the machinery which, Mr. Keeling says, he could not dispense with and still continue his system of artificial feeding. A reservoir of water above the farm premises, fed by a small stream, drives an overshot wheel of 26 feet in diameter, to which the water is conducted by pipes.

The machinery and its cost are as follows:—

	£.
The reservoir puddled with clay	100
The water-wheel	75
The pipes	170
Thrashing-machine	80
Stone-mill	18
Steel-mill	10
Chaff-cutter	10
Pulper	10
Fixing	25
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Another light-land farm to be noticed is at Pendeford, near Wolverhampton; it was the residence of Mr. W. Pitt, whose Report of the Agriculture of Staffordshire, for the Board of Agriculture, has been several times referred to. It is now occupied by Mr. R. H. Masfen, a leading agriculturist in his county. The farm consists of 370 acres of light land on hard sandstone rock, and of 150 acres of indifferent pasture. The management in some respects is that common to the light-land tract. The rearing of cattle is a system only pursued in this immediate district; and the use of a large quantity of town dung from Wolverhampton is an advantage confined to particular neighbourhoods, but requiring notice, as it affects the farming of this part of the county considerably.

The usual rotation is the four-course; but, as an experiment on the clover plant, is modified on part of the farm as follows*:—

1. Turnips (early) or mangold;
2. Wheat;

* Red clover and Italian rye-grass alone are sown where the six-course is adopted.

3. Barley;
4. Seeds;
5. Ditto;
6. Wheat.

By dunging the turnips, and folding half of them on the land, a good start is obtained for the cropping.

Talavera wheat is usually sown in February. The barley which follows is sown at the usual time, after once ploughing the stubble, which is manured with 10 or 12 tons of dung in January or February. The seeds are the usual mixture of clovers with Italian rye-grass, which is so useful on sheep farms for its early feed. The first year the seeds are mown, the second they are fed. Wheat follows without manure, after ploughing and pressing, or consolidating with the Cambridge roller. In the case of the four-course rotation, the turnips are sown with dung only; little artificial manure is used, the farm being within reach of dung from the town. The seeds are nearly all fed.

Mr. Masfen has a flock of 200 Shropshire ewes; and at his annual sale he disposed of 50 rams, 50 cast ewes, and 50 draft theaves. The wether hoggets are fattened. This may be called the parent flock of Shropshires in this county, Mr. Masfen's father having originated the practice of an annual sale of rams.

The neat stock consists of six or seven cows, which form the nucleus of a herd of about a hundred, young and old. The cows calve in October and November. A succession of calves is then bought of the cow-keepers and dairy farmers, who supply the neighbouring populous towns with milk. The calves are weaned at ten or eleven weeks in the winter, when they take readily to trough food. In summer the foster mother suckles them a week or two longer. From six weeks old their principal support during the winter months is on cut turnips, hay-chaff, and oil-cake. A good cow will rear five or six calves a year. This home-reared herd is summered on the pasture and seeds for two years, and fattened in yards between December and May. The summer maintenance of the large head of stock has been shown. Little aid can be got from "snatch" crops, even on light land, in this climate. Stubble turnips are occasionally obtained; and common turnips or rape are sown on seeds ploughed up in June, when they are deficient. The work of the farm is economically done by thirteen horses. The cultivation for turnips is only one ploughing, during autumn and winter, to a moderate depth; and spring cultivation, followed by ridging up.

The economical use of roots by substituting straw and purchased food is well managed by means of "blend-fodder," which consists of the coarsest hay, carted in a partially made condition, and mixed in the stack with an equal quantity of good wheat straw

or oat straw. Last season 20 tons of straw were used in addition to the 30 or 40 tons of mixed fodder; 25 to 30 acres of meadow, and 15 to 20 acres of seeds, is the usual breadth of hay. The homestead is provided with a fixed steam-engine and the necessary machinery.

Cannock Chase.

The masses of conglomerate which cover the greater part of Cannock Chase can hardly be called hills; their rounded contour reminds one of the shape of Dutch cheeses, or of saucers inverted. The surface is covered, for miles together, with heather, or with a delicate green carpet of whortleberries. The waste certainly looks, at first sight, more like a field for sport than for farming; but the ominous tall chimneys which rise here and there, beside the peculiar tackle which, like skeleton arms, overhang the shafts of the coal-pits, and the little villages which are springing up around them, bespeak the wealth which lies below the surface. The straight roads, newly made, and making, prove that the Chase is doomed; but even an agricultural reporter may be allowed to hope that a few fir-clad knolls will remain untouched—a few spots too steep for the plough, where all innovations and improvements may be baulked, showing what Cannock Chase was like when it abounded with grouse and black game, and had its native breed of sheep before the "mineral line" crossed it, or the populous towns of South Staffordshire began to press upon its rude outskirts.

The Chase consisted of about 25,000 acres, on which several enclosures have been effected, and others are in progress. The Marquis of Anglesea, as lord of the several manors, has an allotment of one-fourth of the land, and a further share as owner of adjoining property, which had rights of grazing. The remainder is allotted in the usual way among the surrounding proprietors, and a further allotment falls to the Enclosures Commissioners, who sell it to pay the expense of road-making, &c. M'Clean's and the Cannock and Rugeley Colliery Company hold extensive tracts on lease, parts of which are cultivated by themselves, or by their colliers, who hire small plots. Altogether, a vigorous attack has been made on the heather, which, with a few patches of furze, covers the surface. Mr. Darling, the Marquis of Anglesea's agent, to whom I am indebted for much assistance, enabled me to inspect the different modes of reclaiming the waste. The first operation is burning the heath. The breaking up is comparatively easy, on account of the stunted condition of the vegetation, from the constant grazing of stock. The root-hold is therefore so slight that in some cases the steam cultivator had done the work that is generally performed by a

four-horse plough, turning the first furrow, which is afterwards broken by cultivators and dragged to pieces, and the rubbish burnt or removed; 40*s*. an acre covers the first expense. The land is then limed, and ploughed, and planted with potatoes. Oats are sometimes grown as a first crop; but a good liming and a year's cultivation in roots are the best way to destroy the excess of vegetable matter in the land. High farming must immediately follow, and must be continued on this light soil, which contains no accumulated store of fertility. Turnips, artificial manures, and sheep, and the aid of the great towns near, with that of the increasing population of the collieries, are the means by which this land will be made productive.

The numerous small occupiers have used the spade with great success; and by sometimes buying manure, by keeping a pig, and wasting nothing, they soon make the poorest land rich. The colliers are attached to their garden-plots, where they work after spending the day in pits 250 yards below the surface. This deep subsoiling of theirs is not beneficial to cottages, roads, or any sort of buildings, which crack and sink when the operation is carried on beneath them; but it seems to suit the gardens, for they look well. One of the effects of the mining is to lower the surface, as the earth bends down into the place filled by the seam of coal.

Small freeholders are always found on the edges of extensive commons, where they have settled sometimes from remote periods, gaining the freehold by twenty years' uninterrupted possession. The original home-built hut of turf or wood is in time replaced by a more substantial cottage. I saw a unique dwelling on the Chase, which was simply a railway carriage, abandoned probably by some insolvent company, and now set on a brick foundation, and furnished with a chimney and other conveniences for habitation, by a man who farms his own little manor, and who, I venture to say, will never become bankrupt! On the roadside in Needwood Forest, there are a number of small plots, mostly in pasturage, with neat brick houses, held by freeholders, who were originally squatters; their small domain is generally a paddock, surrounded by a good quick-hedge, trimmed neat and level. A cow is generally kept. I met with one case where the freeholder had irrigated his two or three acres of pasture from a small brook. On Whittington Heath, near Lichfield—a waste of 450 acres of light dry land, which boasts its native breed of sheep—there are several of this industrious class; they invariably give their consent to the enclosure by private Act of Parliament, which can be obtained on gaining the permission of the proprietors of three-fourths of the parish. Their little domains are then increased by the new allotments.

On Lord Lichfield's estates surrounding Ranton Abbey, and on his lordship's Acton and Baswich and Dunstan estates, near Shugborough, there are forty-five small holders of land, with comfortable cottage-houses, and cowhouse, pigstye, &c., suitable to the land they hold. They are let to the most industrious and well-conducted agricultural labourers as a reward, and as an inducement for others of this class to pursue such a course of conduct as would lead landowners to select them for occupations. The land is well cultivated and productive; the houses, gardens, and premises neatly kept. The conditions on which the occupations are held require good conduct and good management. The quantity of land in these holdings is from four acres to seven acres. In a small village on this estate, which I passed through, there were four of these occupations—four detached picturesque cottages in luxuriant gardens, with the cowhouse and out-offices behind, and the pasture and tillage land adjoining. The small meadow which each had was irrigated by a stream at a short distance. The extent of land on three of these occupations was about seven acres, where two cows were kept; on one of four acres, one cow is kept; about one acre of tillage-land is allotted to each. At least half the tillage-land each year is in green crop, and the remainder in corn crop. The green crops are first rye and winter vetches, sown early in the autumn, and cut green for cows before the pasture is ready, and as they are consumed potatoes are set. The corn crop supplies wheat for household consumption, or barley for pig food, and the straw litter and manure. These four cottage-landholders regularly work with farmers near; two are waggoners and two labourers, and have been trustworthy and skilful farm-servants. When necessary, these tenants obtain a little hired assistance to put in or get off their crops, or their employers spare them four or five days in the season for this purpose, and sometimes give a little aid.

Rivers, Streams, and Irrigation.

Staffordshire is remarkably well watered; its hills are the source of numberless springs and rivulets, whose waters are used to a considerable extent for irrigation. Cloud, Mow Cop, and the other boundary heights, which are precipitous on the Cheshire side, slope towards the valleys in that elevated part of Staffordshire; and the direction of these slopes and valleys brings the water into this county. In the "Biddulph Trough," or rather in an adjoining offshoot, the Trent takes its rise. A tributary of the Churnet rises near, and the watershed which divides them is so narrow that the two streams may be seen running away from each other. Every "trough," or little valley, in this Staffordshire

"highland" has its stream, and they all run south, or south-east, and join the waters of the Trent, the Churnet, or the Dove; and while the configuration of the land prevents the escape of any of the native springs, Staffordshire gains a further water supply from the limestone hills of Derbyshire. Probably the great under-ground reservoir of hard water, beneath the town of Burton, now tapped by the wells of the great breweries, is partly filled from this source. It is remarkable that the limestone district is not drained by the streams that pass through it, which are very slightly fed during their course through that formation. This is owing to the numerous fissures in the rock, into which the water drains away. There are two streams, the Hamps and the Many-fold, that disappear by cracks in the earth, and find a subterranean passage of two or three miles in the limestone beds. They rise together in Ilam gardens. The millstone grit and coal measures, which form a large portion of the high land, throw off the greater part of the 35 inches of annual rainfall; and by simply embanking the narrow valleys at Rudyard, Stanley, and Knypersley, three reservoirs have been formed, which feed the Trent and Mersey Canal. This partly fulfils a suggestion of Pitt for retaining flood-water in reservoirs to irrigate the sloping sides of the vales. Our notes on the application of water naturally commence with the River Dove, of which an old doggrel declares that—

"In April Dove's flood
Is worth a king's good."

The Dove has also been called the "Nile of England." The verses are privileged, but the other old saying must be pronounced untrue. The river valley is a deep alluvial soil, rich everywhere, but more valuable when out of reach of floods, because the deposit of mud, washed from the steep valley banks, above Uttoxeter, chokes the herbage with silt and dirts the hay. The floods, therefore, are exceedingly injurious in spring and summer, and are carefully shut out when practicable. On one farm 170 acres of meadow were formerly under water in time of flood; now 50 or 60 acres is a large flood, owing to the combined outlay of tenant and landlord in embanking the river. On Lord Lichfield's estate, on the Trent, between Lichfield Alrewas and King's Bromley, the flood-water has been excluded from 200 acres, with power to admit it at the proper time, by means of flood-gates, for the purpose of irrigation. An August flood, in a dry season, is no doubt useful; but, in general, flooded grass encourages rot in sheep, and diarrhœa and abortion in cattle.

The richest part of the valley of the Dove is that between Rocester and Rolleston and Marston (below Tutbury). Farther down, the valley is wider, more subject to floods, and not so rich.

In this famous district 105*l.* per acre is a common price for land, 3*l.* a customary rent, and 4*l.* or 5*l.* an acre for accommodation land. The fall of the river through this reach is 10 feet per mile, which is much more than that of the Trent. It occasionally proves too rapid for the owners of stock to save their sheep from being washed away. It has been noticed at the Tutbury Mills that there has never been a flood in June for the last thirty or forty years. The period of summer floods is from the 5th to the 20th July. The crop of hay, therefore, might always be saved by shutting up the meadows early in April, so that the crop might be cut in the third week in June.

The soft marly banks of this rapid stream are easily worn by the current; deep holes are made, and the materials deposited at the lower bends of the river; thus the banks have been described as swaying to and fro. Flitering * is the simple plan of protection. It consists in building a wall from the bottom of the river, when it is low, with thorns and weed; this is done with a flitering-hook, and the wall is tied by means of piles driven through it, about 6 feet apart. These are bound with wattles and turfed at the top, level with the surface of the meadow. The abrupt edges of the bank are sloped gently for some yards from the river, and the turf replaced. Nothing resists the action of water, in sapping the river banks, so well as grass.

On the banks of the streams there is a considerable extent of meadow-land which is under artificial irrigation, but a good deal more might be accomplished by combined action on the part of proprietors. About fifty years ago an Act of Parliament was obtained by several proprietors to improve the meadows of the Penk, before its union with the Trent, by keeping off superfluous waters by irrigation; but this mode of procedure proved complicated and costly. The Commissioners "improved" about 100 acres at an expense greater than the value of the land, and the scheme failed. There are mills on some of the streams which head back the water for many miles, and as the question of compensation is only a question of the difference in the cost of water or steam power, it might be arranged if proprietors could agree, and a great improvement would be at once effected.

Irrigation is perhaps never desirable on the richest pastures, nor where the water is poor. I have met with several instances of its abandonment from both causes. In the valley of the Dove twenty-two acres were turned into water-meadows in 1836, at a cost of between 12*l.* and 13*l.* an acre for a carrier, about half a mile long, flood-banks, draining, &c. The tiles for draining and the bricks for culverts amounted to about one-fifth the outlay.

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* *Flitan*, in Saxon, to strive, or contend.

The first summer was dry, and the crop was heavy. The five or six following crops did not produce more than common meadows, and the hay was deficient in feeding quality. Since then the pasture has been grazed, but the stock was removed from November till the middle of April, and the water turned on all the winter, until eight years since, when irrigation was abandoned. On the whole this land was considered to be damaged 5*s.* an acre by irrigation. The water destroyed the clover and best grasses, and it rendered the pasture unsafe for sheep during winter.

It has been said that "Dove's Flood" is less beneficial now than it was forty years ago, owing to the reduced drainage from the farmyards up the stream, and to the care taken of road-washings, and of any other available *run*, which is now turned over the meadows, instead of finding its way into the river. The waters of the Blyth below Blythfield are proverbially poor. Above that town there are some fine water-meadows. Perhaps it is the washings of the steep "sidings," during rains, which give the water its richness. Water that has been used is of little or no use farther down; the occupier above is the wolf, who destroys the lamb below. I met with a very clever mode of applying the water of a muddy stream on some meadows 70 acres in extent. Instead of the water flowing over the sides of the carriers, it is conveyed through subterranean channels, cut from the bottom of the carriers and through their sides. The fall was considerable, and the large volume of swift-running water agitated the mud and carried it over the surface of the meadow, instead of allowing it to settle in the carrier. A slow current fills up carriers, and occasions the expense of frequent cleansing; and in flooded meadows, where the mud is the fertilising agent, it defeats the object to some extent. Some of the best water-meadows in Staffordshire, however, lie immediately below the source of the springs, and are fertilised by water that is always bright. At the head of a little valley, near the Hollington stone quarries, there are several acres of meadows watered by a trout-stream, which rises here in the sandstone rock. The soil is gravel, and inferior, but it is made exceedingly productive by the goodness of the water. The warmth imparted to the land prevents the first meadow from ever freezing. The meadows are but a narrow strip, extending some distance down the glen. The lower meadows are less forward and less productive; and, still further down, the water is found to have lost its fertilising virtues, having parted with its mineral constituents and with heat.

Mr. Dinnock, of Swinnerton, showed me a poor gravel pasture that was exceedingly productive when irrigated from a spring which rises in the sandstone rock above it. The spring had been recently cut off by the London and North-Western Railway,

and the meadow was now unproductive, as it had been formerly. In both these last cases the grass, though abundant, was poor in quality, and the hay made from it was little better than the sweetest oat-straw; and this is always the case when great crops are produced from poor land by means of water. The production of water grasses is an evil avoided by not keeping the water on more than twenty-four hours at a time.

There are about 40 acres of irrigated meadows at Thorpe Hall, where, for want of a natural stream, the proprietor has formed reservoirs to catch drainage and spring water. There is a very ingenious and elaborate system of waterworks, with several inches of iron and earthenware pipes, and enormous underground tanks, for adding doses of sewage from the farm premises. The varieties of the grasses are at present unchanged, and, as the pasture is very superior, it would be a mistake to sop it and spoil it with water.

Mr. Harding, of Acton Trussell, and Mr. Keeling, of Teddesley Hay, also showed me small extents of meadow, watered by small streams, and enriched occasionally in each case with the drainage from the farmyards. The instances of similar contrivance which I observed in my journeys are too numerous to mention. On the banks of all the large streams there is a considerable extent of water meadows, and the abundant water supply of the northern, central, and eastern divisions of the county has been largely appropriated for purposes of irrigation. There is undoubtedly scope for further enterprise, but probably the general opinion is correct that it is unprofitable to irrigate with poor water, or to irrigate very rich pastures. Practical men test the quality of water by a very simple mode of analysis—when the watercress and the brook-lime grow luxuriantly, the water is suitable for irrigation.

Nearly all the water in Staffordshire has the desired quality; that which is deficient usually flows from the gravel-drift, and has a sterile look, with black pebbles at the bed of the stream.

Mr. Pitt was very earnest on the subject of irrigation, and he pointed out the scanty supply of water in some streams in summer, and the superabundance discharged by them in winter, and showed how the waters might be equalised throughout the year by storing it in reservoirs, as they do in hot countries. Economy in this respect is not yet practised, and animals are occasionally nearly drowned in winter, and they sometimes suffer from thirst in summer.

Agricultural Customs.

The custom of Staffordshire is a Lady-day entry; the dung in yards belongs to the landlord; the out-going tenant is paid for

labour only, if any, on the dung; he is paid a consuming price for hay and straw; he takes two-thirds of the corn of a crop of wheat after fallow, leaving the straw and one-half of the wheat if taken after a crop. Wheat after seeds ploughed before Midsummer is fallow-wheat. The crop is usually valued a fortnight before harvest, or the out-going tenant can elect to take his share after thrashing the crop; in which case he must pay the cost of reaping; this is seldom done. It will be observed that the out-going tenant sows the wheat, and the in-coming tenant pays the year's rent. The sale takes place in February or March, and the in-coming tenant sows the spring crops. The in-coming tenant pays two-thirds the cost of the lime applied on the fallow for wheat, and one-third of the lime used on the farm the previous year. The in-coming tenant pays for all necessary acts of husbandry done on the farm, for the young seeds, if not stocked after the 1st of November, for a proper proportion of the unconsumed hay and straw, the growth of the previous year, if properly ricked and thatched, two-thirds the market value of hay, and one-third the market value of straw. There is a probability of valuers agreeing by a general arrangement to allow in future a portion of the cost of purchased food used in the last year, viz.: in the case of grains, one-fourth; of corn, one-third; and of cake, one-half. This does not refer to corn eaten by horses. The custom of valuations is exceedingly vague; there are no acknowledged rules to which valuers could appeal in cases of dispute, and men of experience are unable to agree as to the custom. It is obvious that the tenant has no security for the value of real improvements, and unless allowances are granted for purchased food, the manure left in the yards will be of poor quality. In fact, there have been instances of the tenant stripping the farm by selling off the stack-hay, straw, and root-crop, and leaving no manure. For some years there has been a growing desire on the part of both landlords and tenants to define customs, and to establish a better system.

It may be said of the greater part of Staffordshire that there are no leases. This is remarkable in a county where some of the great proprietors had intimate relations with the Earl of Leicester, the father of the leasing system, whose visits and inspection of farms are well remembered. In 1819 Lord Leicester advised his son-in-law, Lord Anson, to offer leases, with liberal covenants, to his tenantry, who, however, refused them, on the ground that they were satisfied with their present position. Recent discussions induced the grandson of Lord Anson to offer a prize of 50*l.* for the best farm agreement for a yearly holding, which was awarded to Mr. May, of Elford, by a committee selected from the members of the Staffordshire

Agricultural Society. It completes the narrative, and shows the experimental nature of this attempt to frame a good agreement, to state that the successful one has been superseded, after further experience, with the full sanction of its author. Lord Lichfield's new agreement, which is on the point of completion, is well drawn and practical.

Steam-Cultivation.

Steam-cultivation is represented by a very few sets of tackle. Smith's has been working on Lord Hatherton's Home Farm for some years, and I saw it steering its way in rather difficult work, where part of the extensive park had been ploughed up for temporary cultivation, and the trees had been left. Howard's tackle is still doing strong work on a farm of the Marquis of Anglesey, at Sinai Park, where the Royal Agricultural Society's reporters saw it in 1867, and has since performed a very novel feat in breaking up the heather on some portions of Cannock Chase that are being brought into cultivation. The small size of the farms and the limited extent of arable land are drawbacks. Nevertheless, five sets of Fowler's ploughs and engines are available, if required, since they belong to a small company of Staffordshire gentlemen, though they are at present employed on the larger fields of other counties. Mr. Webb, of Smallwood Manor, is the principal mover in this company, and he has purchased one set which will no doubt be confined to the county, and used in connection with his steam mole-plough. His price for ploughing 7 inches to 10 inches deep varies from 12*s.* to 15*s.* per acre, according to the size of the field, and the nature of the soil. Cultivating once costs 10*s.* to 13*s.*, twice over 18*s.* to 21*s.*, the farmer finding coal and water; but of 14,000 acres of work completed, 12,000 have been cultivated.

The Staffordshire Agricultural Society, established twenty-five years ago, divides the county into districts, appoints a committee in each, who offer prizes out of funds placed at their disposal by the general committee—for skilled labour, ploughmen, drainers, &c., and for good cultivation; and, until the cattle-plague diminished the number of its subscribers, prizes open to the county were offered for the best crops of mangold, turnips, &c. These are discontinued for the present. Landed proprietors are allowed to compete for prizes offered for stock, not for good cultivation. These prizes have been a decided stimulus to agriculture, and the meetings and gatherings have helped the work of general improvement (such as the drainage of estates), by drawing attention to such subjects. A local society at Cannock has been in abeyance since the cattle-plague, but will probably resume its show this year. Lord Anglesey and others have offered prizes for good cultivation. A Chamber of Agriculture

was established in 1867, and has held meetings once a month up to Midsummer in each year, besides an annual meeting, and has discussed such topics as the local taxation, malt-tax, the cattle-plague, &c. The game question has not been discussed, and it has not become a great grievance, though in some cases ground game is much too numerous.

Farm Buildings.

In Staffordshire they are generally better, more substantial, and more central, than they are in the arable counties. Less room is required both for corn and stock, and the good but limited accommodation which dairy stock requires can be secured at a moderate outlay compared with the value of the land. An economical system of feeding has been adopted, which introduces the use of machinery. A root-pulper and a chaff-cutter, at least, are almost always found on dairy farms, and the addition of horse-gear and a thrashing-machine is very common. A further extension, to include a steam-engine and mills for grinding and crushing, has been made on a great many estates. There are perhaps more fixed steam-engines and more improved machinery on that of Mr. Sneyd, of Keele Hall, than on any other of the same extent. Those who are interested in the steaming of chaff may like to know that the practice is carried out well and cheaply by a tenant-farmer, Mr. Harding, of Acton Trussell, who feeds a considerable number of stalled oxen. The boiler of a fixed steam-engine, a large iron vat, which is easily filled and emptied, and a tramway for the conveyance of the food to the troughs, are the principal features. There are very few such establishments, and the general opinion is that the cooking of roots and chaff has been superseded by pulping and mixing. Cooking corn, especially maize-meal for pigs, is very general. The dairy farmers are more apt than arable farmers at all such manipulations. They are more accustomed to what the latter would consider to be troublesome work. Their establishments are larger, and in some respects more homely; there are, as a rule, more servants in the house, and there are the calves which must have their food prepared, and a pot boiling for them on the kitchen-fire.

Straw and roots are the most important home-grown feeding articles; in arable districts generally they are abundant, in dairy districts they are very scarce. The dairy farmer has learned to use them with economy; he knows that straw with meal, &c., are to a great extent substitutes for roots, and that roots are relatively costly food on heavy land. He uses, as a rule, less than half the quantity of roots that the root-growing arable

farmer uses, and he substitutes for them, both in the case of sheep and horned stock, a large quantity of dry food, such as straw-chaff, brewers' grains, malt-dust, oilcake, and meal, with which he makes a suitable mixture.

Mr. T. D. Botteley, of Tixall Heath, near Stafford, informs me that last winter he cut up from 70 to 80 tons of straw, with 25 tons of hay; and this food, mixed with boiled corn and oilcake, fattened 40 beasts and 200 sheep, besides wintering 50 store oxen and 300 sheep, with the aid of only 7 acres of mangold, 16 acres of middling swedes, and a few stubble turnips.

The machinery and the necessary store-rooms and mixing-houses occupy an important part of the farmstead in Staffordshire; the amount of barn-room required is not great. The buildings are generally of bricks, which are good and cheap, 20*s.* a thousand. Stone, though plentiful, is costly to work, and timber is not allowed to occupy much space in rich grass districts.

There are very few covered yards, which are undesirable in the rearing of cattle, for sanitary reasons, obvious to those who know that direct sunlight as well as pure air are necessary for young animals. Mr. Bass has a covered homestead at the Deanery Farm, in Needwood Forest, where he fattens a number of famous Galloways, and makes manure which has no doubt been a principal agent in doubling the value of his land to rent, a feat which has actually been performed in a few years.

Colonel Inge has erected a wonderful range of farm buildings at Thorpe Hall, which are remarkable for a great outlay without any ostentation, and for the convenience and utility of all the arrangements. The internal fittings and contrivances are singularly ingenious. The poultry reside, not in a house, but in a palace, or Alhambra, with the great improvement for our climate of a glass roof over the court where the fountain plays; a horn calls the birds to meat. They roost and nest in great state, and a very ingenious zinc guard protects them from feline enemies. I must mention the underground passage for pigs, by which they pass to their pastures and promenades without the inconvenience of crossing an approach road. The courts for lambing, the paved dipping pens for sheep, the residence for rams, and the adjoining harem, are all superb. In the midst of an assemblage of buildings, too numerous to mention, is an amateur farmhouse where the servants employed on the farm and in the dairy are quartered. An extensive cellarage and larder supply their daily mess; a wing of the house is appropriated to each sex, and here, if nowhere else, the young labourer can live in comfort, though single. The discipline, so necessary where the number is large, is well preserved; and the Colonel's arrangements are perfect.

Amongst novel and ingenious contrivances must be noticed the balance-gates, patented by Mr. Webb, of Smallwood Manor, which are opened by a simple mechanical contrivance on the approach of a carriage. They obviate the necessity of a lodge, and if their appearance, when rising into the air to let the visitor pass, is a little startling, they are certainly exceedingly convenient, and especially suitable for small gates to secure cattle from lawns or gardens.*

The labourers' cottages are in many instances superior. On an estate of more than 20,000 acres (Lord Lichfield's) there are, or will be in a few months, three bedrooms in every cottage. There are very many instances in which proprietors have erected superior cottages on their estates. But as the outlay is not remunerative, and must therefore be incurred from motives of good taste and good feeling, there are many cases where, from want of means or some other cause, this outlay has not been made. It is difficult, when improvements have been partly effected and partly neglected, to give a tolerable idea in a few words of the actual state of things. There are fewer cottages than in the southern counties generally, and probably their average condition is better. The cottages are generally built of red bricks, and blue, or rather black, tiles, of capital quality, and very often so hard that time does not tone down the colour to the grey quiet tint which is so agreeable. The moss-covered houses, such as one sees in Sussex, Surrey, and Kent, are seldom met with; and one misses the vine, which does not ripen here, and therefore never adorns the cottage walls. The cottagers' well-known attachment to their gardens helps to compensate them for many hardships. Every cottage should have a good garden in front, if possible on the south side, near the road. That is the best site and the pleasantest spot for evening labour, and the harmless gossip which sweetens it. A row of cottages having gardens behind is an unfortunate arrangement, which thrusts out of sight one of the brightest and happiest spots on earth.

The Sheep and Horses of Staffordshire.

The former are almost invariably Shropshires, more or less resembling the original type, which yet remains on Cannock Chase, as well as the various long and short woolled breeds which have been used to improve it. The extremely dry surface of the Chase and its good climate have produced a sheep much heavier than the native heath-breeds elsewhere. Their descendants retain their hardy prolific qualities, and their excellent grazing character; and they frequently retain some points

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* They are manufactured by Mr. Bewley, of Uttoxeter.

of resemblance which modern breeders are now obliterating, viz., the arched back, dropping behind the shoulders, the long countenance and bare head, the long limbs, and the speckled face and legs. The original breed had a short light fleece, of about 3 lbs., and a carcase which might be fattened at three years old to 8 or even 9 stone; the derivative animal has a deep, heavy fleece, a compact form, a close-woolled head, the dark face of a Down, and a frame weighing 10 stone at thirteen months, without extraordinary treatment.

The breeder's art has been skilfully exercised in many flocks of local repute, and the means employed may be traced in the great variety of character which appears in the sheep commonly kept and commonly called Shropshires, which, however diverse in appearance, have in general the common quality of doing well on grass, or on seeds. They are extremely good mothers, and there is good evidence that the yield of lambs in many flocks is 150 to 100 ewes.

The native breeds on other heaths and commons have assumed characters varying with the soil and other circumstances; that on Whittington Heath, near Lichfield, has the same appearance as the Cannock sheep, but is rather larger.

There is every mixture of white, black, and rusty-haired pigs kept on the dairy farms, and fattened on whey. Many farmers keep two or three sows; but the principal supply of store pigs comes from the breeding district of Shropshire. The sort kept is generally the bacon-hog of the large breed.

Many farmers breed their own horses, and large numbers are brought from Wales, Derbyshire, and other breeding counties. There are a few of the larger, or dray, horses, and the rest are either the smaller-sized, or Welsh, van horse, or the rough-legged midland counties' breed.

Draining.

A large area in this county until recently required draining; a large extent has been done, and that which remains is chiefly on the smaller and less important properties. Like the other great improvements, it has been principally effected in the last thirty years. Under an old, but not the best, system the tenant found labour, the landlord pipes; recently a large extent of under-draining has been done by means of the Lands Improvement Companies, or by private expenditure on the part of the more opulent proprietors. On the whole, the draining under Government inspection has not been well carried out. It was perhaps too extensive for thoroughly effective superintendence; it is too costly; and, moreover, the principle of a uniform depth of 4 feet, when the fall admits, is a bad one. In many instances

4-foot work has not drained the land, and shallower drainage would have done so. This is the case on a large portion of Needwood Forest, where the subsoil is paved with an impervious floor of hard clay, which prevents the water from sinking. The consistence of a subsoil depends on the materials of which it is composed, and the pressure to which it has been subjected; it may have been consolidated into a hard rock, or it may be a soft absorbent soapy clay, with great powers of expansion and contraction. In the case referred to, it is a hard solid clay, into which water does not penetrate. The retentive subsoil forms a watertight bottom, and the surface-soil becomes a reservoir. The pipes, therefore, must be laid on the bottom or floor, and not underneath it. In strong clays, the excess of rain-water does not sink into the subsoil quickly enough, if at all. Some clays crack to a considerable depth at the period of the year when they contract, and water then flows freely through them; but there are hard solid clays which have not this property, and in these tough clays the drains should not be laid deep, because very little cleavage takes place in them and the water does not sink rapidly. The power of contraction in drought, and of expansion when the soil is again wetted, varies with its composition. In general the soil is harder and less permeable to moisture as the depth increases. Sometimes the surface stratum passes into an impenetrable subsoil at between 20 and 30 inches. The mole-plough is then as effective as pipes, and very much cheaper. Mr. Willoughby Wood informs me that he has re-drained land at 3 feet (and 6 yards), which had been drained at 4 feet, ineffectively, under Government superintendence. On that land he finds, at the former depth, traces of a brashy gravel, below which is a hard impervious clay. Mr. Bass has re-drained at Rangemoor for the same reason, and many other instances could be given. The late Mr. Arkwright, of Dunstall, induced Mr. Parkes to drain his land at 10 yards' distances, instead of the usual distance of 12 yards. But the depth (4 feet) proved too much for that soil, and it has been re-drained by a subsequent purchaser. At Croxden Abbey, 4 feet by 10 yards has answered well in an open subsoil, a soft good-cutting marl, which the drainer undertakes readily at 1½*d.* per yard, and earns 2*s.* 6*d.* a day. On the heavy shale of Trentham the Government draining, at 8 yards and 4 feet, did not master the rushes, and has been replaced by drains at 6 yards, and the 1½-inch pipes, which were soon choked by a white earthy matter, were abandoned for larger ones. I refer to these exceptional instances of failure to show that there is no golden rule applying to depth and width. If the object be to remove the water, the drains must be laid at the depth and width indicated by the

nature of the subsoil; and in draining some hundreds of acres, I have found that these points should be tested by trial, and not settled by routine. But sometimes the object has appeared to be to carry out certain official regulations, the depth has been measured by red tape, and pockets only have been drained!

It was in this county, on the estates of Sir Robert Peel and Mr. Thomas Gisborne, that Mr. Parkes's system was first carried out by the originator. Deep draining was the subject of one of Mr. Gisborne's able articles in the 'Quarterly Review.'

On Lord Lichfield's estates about 7000 acres have been drained during the last fifteen years by the experienced agent, Mr. Wyatt, who availed himself of local skill and instructed the superintendents who took charge of the large staff of workmen. The drains were done at various depths, which were adopted after digging and trying the subsoils. Where veins of sand existed in the clays, bottom water was generally found, and this required thorough draining at a depth of not less than 5 feet. On the gravel-drift a porous subsoil is frequently charged with water, derived from a higher level, and rising in wet weather to a point where it proves injurious to the cultivated surface. In such circumstances Mr. Allen, of Knightley Hall, has drained the gravel 5 to 6 feet deep, at distances varying from 15 to 20 yards. Rain-water probably seldom finds its way into these drains in a locality where the average rainfall does not exceed 24 inches; it is absorbed by the surface above the drains, and does not hinder cultivation.

The mole-plough, an ancient implement so effective on Essex clays, has recently been introduced by Mr. Webb, of Smallwood Manor, near Uttoxeter. I saw this useful implement in Lord Bagot's Park attached to a 14-horse-power steam-engine, and armed with a large mole, 4 inches in diameter. It was marching over ten acres a day, at a depth of 30 inches and 1 rod apart, and would, therefore, soon complete its 300-acre task. The price charged for the work is 20*s.* an acre, and the cost of mains and fetching water, coal, &c., is 7*s.* more. In all clay subsoils this is a most satisfactory mode of draining. Lord Bagot has expended 14,000*l.* or 15,000*l.* in draining in the last fifteen years by aid of the Lands Improvement Company. The depth was never less than 4 feet, and the distance about 8 to 12 yards, according to the nature of the subsoil. The effects are satisfactory.

Labour.

Corn is usually cut by piecework, at prices which in the case of wheat range from 10*s.* per acre to 20*s.* or more. When reaped, it is usually done by the thrave of 24 sheaves, the number varying from 30 per acre for a light crop to 60 per acre for a strong

one; the price is 5*d.* per thrave. Mowing with the scythe is done at rather lower prices. In the neighbourhood of towns, where straw is in demand, "badging" (fagging or bagging) is preferred. The best and most painstaking badgers come from the neighbourhood of the Peak and the Derbyshire hills. The "Peakrils," as they are called, do a good deal of badging in the early districts, and return home in time for their own harvest; the price is about 18*s.* per acre. The Irish and other strangers who migrate from towns and districts where harvest is later are employed to cut wheat; the home labourers load and stack the corn by the day, and cut the later crops. Barley costs 3*s.* to 4*s.* to mow; 9*s.* if sheaved and set up, which is preferred. Oats cost 3*s.* to 6*s.*, or 9*s.* if sheaved and set up. In Staffordshire generally the carrying of corn is done by the regular labourers, milkers, &c. In some cases they are paid 25*s.* for the harvest month, with a large quantity of beer for their encouragement when at work; but generally the wages of regular men are not raised in harvest; they are either paid for overtime, or much more generally they get food and beer on the days they are at work. As there is no established custom, the practice varies a good deal. On some farms luncheon is given, viz. bread and meat, cheese and beer, and after late carrying, say five or six times during harvest, they come in the house to sup. On other farms the feeding is more extensive, extending to breakfast, dinner, "fours," and supper on busy days; the eating and drinking accompanies and sustains the work. If carrying begins late, or ends early, the first or last meal is waived. A hot supper of meat and vegetables, bread and cheese, is provided at about 8.30 P.M., or whenever the work is over. A gallon of ale per acre is added to the usual allowance of one quart of beer a day all the year round. In short, beer is commonly given without stint, and it is a bribe that never fails. Work never comes amiss when beer abounds; it oils creaking wheels and prevents rust. The machinery of a harvest-field, if I may so speak of the labourers, would stop in a moment if the beer were withheld.

Some farmers have given up feeding because it is troublesome and brings work into the house; but the old plan is far more popular than paying for overtime, however liberal the wages may be. With plenty to eat and drink the men work willingly all day, and carrying goes on cheerfully till ten or eleven o'clock at night, when a good supper is to follow; but, without this expectation, work comes to a stop at six or seven. After a hard day's work and supper, the men go quietly home, and are orderly and well conducted. A harvest supper is a popular and it is a common celebration after harvest. Reaping-machines are becoming universal. Women and families do considerable work in harvest. In hay-harvest 4*s.* 6*d.* to 5*s.* per acre, without beer, is a common price for mowing

grass, and 6*s.* for a strong crop. Beer is given when the hay is carried, on the same principle as at harvest. Frequently a bonus of 10*s.* is given at the end of haytime, and afternoon luncheons are allowed. Mowing-machines are now very much reducing the expenses.

A dairy-maid capable of managing a dairy of forty cows, without a mistress, receives from 18*l.* to 22*l.* a year and board; assistants, with a mistress, receive from 8*l.* to 14*l.*

The usual wages of a milker are 14*s.* a week all the year round, besides the harvest perquisites. Common labourers get 12*s.* in winter, and they do hoeing or taskwork, according to custom. Married ploughmen receive 12*s.*, a house and garden, carriage of coal, which costs about 10*s.* per ton at the pit, and ten rods of potato-ground, manured and prepared, and allotted in the field of the employer. The total amounts to 15*s.* a week. Day men also get 12*s.*, and the potato-ground on farms where this custom prevails. Local differences in the price of wages in different parts of the county are slight. In the south the labourers are drawn off by the mining and manufacturing towns; in the north by the potteries. A man can go from one extreme of the county to another in two hours and a half for less than 5*s.* Around Burton the employment of a large number of men in the great breweries in the winter months only causes an unequal disposition of labour in that locality.

Statute fairs, with all their bad accompaniments, are upheld at Burton, Uttoxeter, Tamworth, and Fazeley. On the occasion of these rough carnivals, young persons of both sexes crowd the streets and market-place, where the hiring proceeds. The most respectable repair punctually to their engagements, but they are exposed to the evil influence of those who are bent on mere pleasure and dissipation. The evils are apparent, and it is much to be desired that masters would discourage the fairs by hiring servants elsewhere.

The Limestone and Moorland Districts.

It is seldom that romantic scenery and fine land are found together; but they frequently are on the limestone range that ends at the Wever Hills. Except in the river glen called Dove Dale, with its huge walls of grey limestone 800 feet high, the rock seldom appears at the surface, which is generally covered with grass. The hills are as smooth as the Downs of Hampshire and Wiltshire, but they are on a larger scale, and the sheep, which are scattered very thinly over them, are all of a heavy long-woolled breed. Cows are the grazing stock of this singular district, and though the long winter and the difficulty of finding

food and bedding are drawbacks which reduce the average returns, the cheese is as good as, and in some instances the pasturage is quite equal to, that of any parts of Staffordshire. The parish of Butterton, which is almost entirely in grass, is perhaps the richest in the county, and the land is entirely the property of farmers and others living in the village; and so good is it, and so great the competition for it, that 600*l.* has recently been given for 5 acres by a small farmer, and one freeholder can boast of 9 acres worth 1000*l.*, with the cottage and cow-house. There are other localities where 3*l.* to 4*l.* an acre are common rents, and some of the land is rented at 5*l.* This latter rent can only be paid by men who work at the copper mines, or limestone quarries, while their families do the work of the dairy. A farmer of 50 or 60 acres seldom pays more than 50*s.* an acre.

The value and the rent of land have greatly increased of late years. The highest returns in cheese-making which I met with were in this parish, where a woman with 4 cows and 12 acres of pasture made 22 cwts. of cheese. The great drawback of the hill district is the climate, which, though favourable to grass, prevents the cultivation of a due proportion of ploughed land. The bleakest exposures are quite bare of trees; there are a few in the smooth wide hollows, which resemble the coombs and basins among the chalk hills, but no kind of fruit trees thrive even in the most sheltered situations, except the gooseberry and currant. Apples and cherries are rare, and even the damson, which flourishes at Wootton-under-Wever and the adjacent parishes, where it is largely grown for sale at distant markets, is unable to travel the few hundred feet which would bring it into the gardens of the hill farmers. In ascending the highlands the gradations in the scale of vegetation are very striking. The steep road which leads from Oakamoor, in the narrow glen of the Churnet, is for the first half-mile like a white chalk lane in Surrey; but the oaks and beeches are then replaced by rows of Scotch firs, which become blacker and more ragged in appearance, till at the edge of Wever Hill a stunted scrub or two of elder and thorn alone remain in that unsheltered site. The northern portion of the hill-district has been already described as consisting of millstone grit and other rocks; they are covered by soil and grass of a very inferior description. The line where the two formations meet is very clearly drawn on the surface by the sudden change in the vegetation. This line crosses the road halfway up the hill above the village of Onecote, and is the boundary between the clovers and good herbage of the limestone and the harsh rough grass of the moorland; you step at once from 30*s.* an acre to 2*s.* 6*d.* The hay-fields are three weeks later, the stone-wall fences are blacker, and the country poor and

barren. Four plants mark the exact spot where the soil changes —the furze, the heath, the whortleberry, and the sorrel. Two systems are pursued in this extensive district, one adapted to the farms which have little or no arable land except the garden and potato-field, and the other which prevails on the farms which are partly under the plough. A good example of these is a large farm of 400 acres at Wever Hill. The soil is mixed with chert or limestone flint, and often covers the rocks to a depth of only 6 inches. It produces excellent grass when well treated, otherwise the best herbage soon fails. The natural herbage of these shallow soils resembles that of the Downs; under good management 100 acres will maintain, summer and winter, a dairy of 15 cows for cheese; besides 40 ewes, whose lambs will be sold in autumn; 6 or 7 cow calves will be reared annually. About one-third of the 100 acres is under the plough, and is under the following crops:—

Years.	Crops.	Years.	Crops.
1	Turnips.	9	Oats.
2	Rape.	10	Ditto.
3 to 8	Seeds.		

The oat stubble is ploughed up at harvest and again in spring, then cultivated and the turnips drilled on the flat. The turnips as well as the rape are used to fatten the draft ewes, and a portion is removed. After the turnips the land is ploughed once in spring and then cultivated previous to sowing broad-cast 2 lbs. per acre of rape; at the end of May the seeds are sown with the rape, and consist of a mixture of the usual permanent grass seeds. The sheep eat off the rape without being folded, so as to avoid too much treading on the young grass. The old turf is ploughed once only for oats, which are sown the first fortnight in April; the first year's oats are ploughed once for the second crop at the time of sowing. This simple and inexpensive mode of cultivation is practicable because the crops are not liable here to the attacks of wire worms, &c. The usual artificial manures are applied to the crops. Bones are indispensable; they are applied to turnips and to rape, and in the case of oats they increase the crop as well as produce a much heavier sample. Good pasture can be retained for years by the use of bones. On one farm I saw four-year-old pasturage full of the best grasses, divided by a stone wall from a field where the familiar turf of the Downs has supplanted the more productive herbage, because the dressing had been withheld, and I was assured by an experienced farmer that 7 cwts. of bones applied to this field in January would bring up a plentiful crop of clovers the same season. But the best practice is to plough up worn-out turf, or rather never to allow it to become so.

I have described what may be called for this district an arable and sheep farm. The great autumn fairs held at Newhaven (in Derbyshire) and at Calton are supplied with their eighteen-month-old colts from these farms, which generally maintain one or two breeding mares. Two localities, usually isolated and solitary, become once a year scenes of considerable animation. The great supplies of stock, however, are not drawn from the farms referred to, but from those which cover by far the larger portion of the district, where the stock kept in summer must be annually reduced, because the land is almost entirely in grass, and provisions are scarce in winter. One such farm, rather exceptional in size, consists of 400 acres, on which a dairy of 120 cows is kept in the summer, 60 or 70 of which are sold in the autumn and replaced ready for turning out on the customary day (May 18th). There is no arable land, and there is no farmyard: the stock, both young and old, is tied up in the winter; wheat-straw is purchased from a distant district for litter, and for chaff to mix with bran, cake, bean-meal, &c. On this particular farm 100 Leicester lambs are bought in autumn and sold fat in June or July; no calves are reared; it is more general to keep one ewe to about two acres, and sell the lambs in the autumn (this refers to the limestone; on the moorlands the number of sheep is very small). On a moorland grass-farm about one-fifth is mown for hay, and about 15 cows and 20 ewes are kept during the summer, and the usual proportion sold in autumn. Instead of selling the sheep, some farmers send them for the winter to other districts from about 10th October to 25th March. The sheep are either pure Leicesters or crossed with Cotswolds or Lincolns; rams of considerable value are sometimes bought, and few traces remain of the blood of the "old limestones" and native breeds. The calves are generally reared and sold at the fairs referred to. The variations of practice are to reduce the dairy in favour of rearing stock for sale at 18 months, and to graze the richest pastures with fatting oxen. A cow calving in April will make from 3 to $3\frac{1}{2}$ cwts. of cheese, and in winter, when cheese-making is over, butter-making begins, and the milk is thus disposed of until within ten or eleven weeks of calving. The quantity, though small per cow, is large in the aggregate; it is taken to Leek, which is the great market of the district. The dairies are replaced in spring from Leek and other fairs. In the "moorlands" small mixed hardy cows are preferred to the larger shorthorns. A deficiency of springs in some neighbourhoods has been overcome by the artificial "meres," which are constructed with clay, puddled with a layer of lime to keep off worms, &c., and the bottom paved with stones to strengthen it. On some parts of the limestone

abundant springs rise from the "shake holes" in the rock: as at Grindon, where Ryebrook rises. Part of this parish, as well as Butterton, was famous seventy years ago for a strong soil, which rotted sheep by flukes in the liver. This character is retained where an undrained soil, generally rich and deep, rests on black "shale," which moulders when exposed to the air. Sheep can only be kept one winter, and must be fattened in the spring.

In conclusion I beg to express my thanks for the ready assistance I have invariably received during my various excursions. I am especially indebted for much general assistance and for many useful introductions to Mr. Tomkinson, of Newcastle, the Secretary of the Staffordshire Agricultural Society, and to Mr. Sydney Evershed, and Mr. R. W. Abbotts, of Burton-on-Trent.

APPENDIX.

The following statistics are taken from the Census Tables, and from the Agricultural Returns collected by the Statistical Department of the Board of Trade:—

Area of Staffordshire in statute acres, 728,468.

Population.

1851.	1861.		1868.
608,716	Town	402,644	463,000
	Country ..	344,299	394,871
		746,943	857,871

Increase between 1851 and 1861 .. 138,227 = 23 per cent.

Number of Inhabited Houses.

1851.		1869.
116,273	.. ..	147,244

Gross value of property rateable to the county rate, 3,104,090*l.*

Excluding the Metropolitan Counties, the percentage of increase between 1851 and 1861 was greater than in any other county in England except Durham, which increased 32 per cent. The numerical increase was greater than in any other counties except Lancashire, Yorkshire, Middlesex, and Surrey. In the agricultural counties of Cambridge, Rutland, and Huntingdon, the population diminished in the same period 5 per cent., 3 per cent., and 2 per cent. respectively. Lancashire increased 19 per cent.

The proportion of the town population of Staffordshire at the last census was 53·9 per cent., that of the country population 46·1 per cent. In Lancashire the proportions were 69·7 and 30·3 per cent.; in Warwickshire 72·5 and 27·5 per cent. In the agricultural county of Huntingdon the proportions were reversed; they were 25·3 per cent. in towns, and 74·7 per cent. in the country. Almost the same figures would apply to Rutland and Herefordshire.

Total of Acreage under all kinds of Crops, Bare Fallow, and Grass, in 1868.

	Acres.
Corn-crops	129,171
Green crops	44,545
Artificial grasses and clover under rotation ..	45,631
Permanent pasture, not broken up in rotation (exclusive of heath on mountain lands)	340,112
Bare fallow	11,242
Flax	22
Total acres under cultivation ..	570,723
Houses, water, &c., or in waste, or occupied by roads	157,745
Total	728,468

Green Crops.	Acres.	*Corn Crops.*	Acres.
Potatoes	9,840	Wheat	60,092
Turnips and swedes	28,376	Barley	29,495
Mangold	2,434	Oats	30,594
Carrots	137	Rye	805
Cabbage, kohlrabi, and rape ..	926	Beans	3,969
Vetches, lucerne, and any other crop (except clover or grass)	2,832	Peas	4,216
	44,545		129,171

At the date when these returns were collected, 25th June, 1868, one-fifth of the land entered as fallow or under green crops was under bare fallow. The acreage under arable cultivation was 230,611 acres, of which 129,171 acres were under corn-crops, and 101,440 acres were under green crops, artificial grasses, flax, and bare fallow.

The four-course rotation, which in purely arable districts is found so desirable, is seldom adhered to under dairy farming. The size of farms is small. The number of occupiers was 12,867, and the average extent returned by each, 44 acres.

The Average Size of Farms in several Counties is—

	Acres.		Acres.
Staffordshire	44	Berkshire	87
Derbyshire	40	Dorsetshire	95
Cheshire	40	Essex	77
Cornwall	36	Hampshire	88
Lancashire	33	Leicestershire	57
Middlesex	42	Norfolk	63
Wiltshire	107	Sussex	76
Northumberland	122		

These figures will supply the means of making certain comparisons, but they do not show the comparative extent of land occupied by the different classes of farmers. In Staffordshire the average size of farms is reduced by the small occupiers around the large towns and by the small freeholders on Needwood Forest and Cannock Chase.

The dairy farms are generally under 200 acres; 400 acres is a very large farm. Even in the light-land districts the farms are small; they are generally under 300 acres; 400 is quite an unusual size, and there are very few farms exceeding 500 acres.

Live Stock in Staffordshire on 25th June, 1868.

Cattle	125,046
Sheep	365,945
Pigs	53,788

As both lambs and calves are born almost entirely in March and April, the number of head at the time of collecting the returns would be greater than at any other period of the year. Dairy farms are moderately stocked with one ewe to three acres of pasture, with her progeny, including more than 100 lambs per 100 mothers, and about half last year's crop.

Proportionate number of live stock to every 100 acres under crops, bare fallow, and grass, in each of the following counties, on the 25th June, 1868.

	Cattle.	Sheep.	Pigs.
Stafford	21·9	64·1	9·4
Bedford	11	80·4	12·3
Cambridge	8·3	74·4	11
Essex	8·6	63·3	12·7
Hants	7·8	96·3	10·4
Norfolk	10·1	84	9·6
Leicester	26·2	106·1	6·6
Suffolk	7·9	78·5	15·7
Dorset	15·4	124·8	—
Kent	9·4	156·1	—
Chester	27·1	40	—
Wilts	11·4	110·6	—
Cornwall	30·1	91·1	—
Lancashire	29·6	45·8	—

In the great turnip, or arable, districts of Norfolk, Suffolk, Essex, and Cambridge, the cattle fattened in yards and stalls during the winter are principally sold by Midsummer, or the comparison would be much less unfavourable.

Probably, if the returns were made at Christmas, these counties would equal Staffordshire in the number of cattle.

Annual Consumption of Wheat in Staffordshire.

	Quarters.
By the town population at $6\frac{1}{4}$ bushels per head	366,625
Country population	312,606
Total	679,231

Wheat grown in Staffordshire at 26 bushels per acre (after deducting seed), 195,299 quarters. A great part of the produce of the pastures of the county is exported beyond its boundary, and the *remains* of human food consumed in the towns is wasted; this is an enormous drain on the soil, by which it would be rapidly exhausted if the constituents of fertility were not returned to it by the immense importations of food for cattle and of bones and other manures, by which the condition of the pastures is restored. No Staffordshire farmer can, however, look on the above figures without perceiving the lamentable waste which arises from the present system, by which the remains of food consumed by live stock is alone preserved. The sewage of all the towns is wasted, the few slight attempts to use it in irrigation are not worth naming, and the deposit of a small portion of the solid matter in tanks at Burton-on-Trent and Newcastle preserves little that is valuable. The streams receive what ought to be a source of national wealth; even at Trentham the river is polluted by the sewage of the Potteries. A medical man in the county organised a rather extensive trial of the dry-earth system, which succeeded admirably as long as the parties were induced to attend to details, but in that respect habit proved too strong. In the present state of popular ignorance and indifference, regular inspection, secured by legislation, appears to be a remote, though perhaps the only, remedy.

The following particulars are extracted from Mr. G. J. Symons's 'British Rainfall':—

Comparison of the Rainfall in 1868 *with previous years.*

	Average.				
	1840–9. Inches.		1850–9. Inches.		1868. Inches.
England	33·37	....	35·66	....	36·07
Ditto (omitting Scathwaite)	29·44	....	30·98		

The greatest rainfall in 1868 was 207·49 inches, at the Stye, a station in Cumberland; the least was 15·37 inches, at Witham, in Essex.

The Rainfall at the Stations in Staffordshire in 1868 *was*—

Stations.		Authorities.	Inches.
Wolverhampton	(Oaklands)	H. Ward, Esq.	28·84
,,	(Wadham's Hill) ..	Rev. E. W. Winter ..	23·61
Stafford	(Infirmary)	P. H. Greaves, Esq. ..	25·18
Burton-on-Trent	.. ..	J. Matthews, Esq. ..	24·11
Stoke	(Barlaston)	W. Scott, Esq.	29·43
Oakmoor	(Ellaston)	Rev. Sir C. R. Lighton	37·48
Leek	(Rudyard)	J. Forbes, Esq., C.E.	31·71

XI.—*The Improvement of Grass Lands.* By Clement Cadle.

Prize Essay.

The term "Grass Land" is so comprehensive that, with the exception of forests, it describes almost entirely the original and natural condition of the soil before the commencement of tillage. Grass Land is still to be found in every conceivable position, of every description and quality, and on every geological formation. All these varying circumstances make it difficult to treat of its improvement in an Essay, and any rules laid down or opinions expressed will necessarily find dissentients, either from prejudice, or from general rules not being applicable to every locality. The chief and best remedy for the removal of prejudice is time. Few are so wedded to their convictions as not to abandon them after having witnessed the successful working of systems to which they have been opposed; and although all general rules for farming may sometimes fail, yet it is possible to lay down principles of almost universal application and value. It will, therefore, be my endeavour in the following pages to give my personal experience in reference to the subject treated upon, coupled with observations made in valuing some hundreds of square miles of land, of almost every description, from the extensive hill and sheep lands, covered more or less with heath and gorse, and worth not more than a rental of 3*s.* or 4*s.* per acre, to the primest meadow land, capable of feeding out beasts by the end of July, without the use of oilcake or other artificial food, and producing a rental of from 4*l.* to 5*l.*

For the purposes of this paper, grass land may be conveniently treated of in three classes :—

1st. Inferior: comprising hill and mountain land, and much upland pasture, chiefly grazed with sheep.

2nd. Medium : not good enough for fattening stock, but chiefly devoted to dairy purposes, to the grazing of sheep and the rearing of young stock.

3rd. Good : used more especially for fattening cattle and sheep, and occasionally for dairy purposes.

Inferior Grass Land.

Under this head, as already mentioned, may be classed a large proportion of the hill land and upland pasture, whose improvement is difficult to treat of on account of its low fee-simple value; much of it not being worth more than 10*l.* or 12*l.* per acre. Great caution is required in recommending an outlay, perhaps equal to the fee-simple value, on land such as this, and therefore, of necessity, doubling the rent. I have always felt more hesitation in recommending improvements upon land of this description than upon that which is valuable. However, the outlay may be lessened by resorting to mole draining, and the use of straw, thorns, and other expedients, which upon better land could neither be recommended nor tolerated. Moreover, if a heavy outlay has to be incurred, it may be desirable to extend the making of the improvements over a longer period than would be advisable in the case of land of a better description. Much of the land comprised in this section is too dry, especially on sandy and light brashy soils, which, from their tendency to encourage the growth of couch grass (*Triticum repens*), cause considerable difficulty. Many persons who have been accustomed to the treatment of grass land all their lives would be surprised, if they were to take a spade and dig up the soil in a meadow of this class, to find how the root of couch grass abounds; and from its free growth, it destroys the fine grasses, especially when sheep are the principal stock kept (and this is generally the case on the class of soils under consideration), as they bite the finer grasses into the earth, and reject the couch, which is thus enabled to get even farther ahead of the other herbage.

In the improvement of this section of land, draining, if the soil is wet, is the first step to be taken; unless the stagnant water in the soil is got rid of, it is useless to attempt other improvements, for, as the evaporation continually going on keeps the surface cold, manure is almost thrown away, and the grass is sour, and is therefore rejected by stock until compelled by starvation to eat it; hence the animals do not fill themselves and do not thrive,

as they otherwise would. This draining may be done as circumstances admit; but it is desirable, if possible, that it should be carried out in a permanent manner, with pipes. Failing this, when the value of the land will not admit of pipes, one of the following plans may be advantageously adopted:—

1st. Mole-draining, which is effected with the mole-plough, has been known by me to answer very well, both when performed by horses and by steam-power; and although the drains are not laid so deep as when constructed with pipes, still they are more numerous, and thus to some extent the lack of depth is compensated for. But the farmer must be careful not to allow moles to harbour in the fields, otherwise they will soon destroy the drains. This mode of draining may be effected at an outlay of from 20*s.* to 40*s.* per acre.

2nd. Thorns and straw may also be used as a substitute for tiles when the subsoil is very stiff, and they will often last 20 or 30 years; for, after the material itself has decayed, some soils are found to set firmly enough to leave a passage for the water to escape.

3rd. Plug-draining is also sometimes resorted to, where the subsoil is very stiff; but I cannot say much as to the lasting character of this system, not many instances of its adoption having come under my notice.

4th. Stone is another material often used as a substitute for pipes, and where it is plentiful and the work is properly done, the plan answers very well. Where, however, the soil is rocky, drainage constructed in any manner is necessarily a very expensive work.

5th. Another mode of getting the water from the subsoil is by the construction of open ditches; and though these are very objectionable, the plan is often adopted, especially on the sides of hills, and where the water exists only in patches.

Having by either of the foregoing methods relieved the soil of water, the next step will be to remove any bushes or brambles; or, on some land, gorse and heath; each of which may with a little perseverance be speedily and effectually got rid of, by taking care, after once grubbing up and removing them, to let a man go over the land every summer with a scythe and cut everything off close to the ground. This, if well attended to, will in a few years destroy the nuisance. Thistles should also be cut every summer, as soon as they come into blossom, and should never be allowed to seed. The land having been drained will then be in a fair condition for renovation with grass seeds, the sowing of which will prove remunerative. A mixture of the grasses described at the end of this paper may be employed, or, if these are considered to be too costly, a bushel or two of perennial rye-grass may be used, but

this is not so desirable as the natural grasses. Of course, the value of the land is an important consideration in regard to all these recommendations, as many things which could not be allowed on land of higher value may be expedient on that of which I am treating. These remarks also apply to dressing and manuring, which come next under consideration. Farmyard manure, bones, special manures, lime, salt, earth, road-scrapings, —in fact, almost anything that can be obtained,—may with advantage be used on this class of land. But the first dressing should be as substantial as it can possibly be, with the object, not only of manuring the land, but also of inducing the growth of a fresh and better herbage. The consumption of roots and the use of artificial food will also be very beneficial: these will be further treated of in another part of this paper. Wherever practicable a good harrowing and rolling every year will be found very beneficial. In many cases it will be more desirable on this class of land to break it up, and lay down with rye-grass or permanent grass-seeds. I have seen many instances in which the land has been made to keep five times the quantity of stock by its having been simply ploughed and sown with rye-grass; but if rye-grass only is used, it will require to be renewed every third or fourth year. This, however, will often pay far better than if the land be left in its original condition.

I have said nothing of fern, which in some instances is largely grown on this kind of grass land. I have never been able to satisfy myself that the fern is prejudicial. It grows chiefly on land that is dry, and on soils that are liable to get burnt up in a dry summer; and I have often observed that though on a part of a field where no fern grew the grass had been scorched, yet on other portions, where there were ferns, it had continued to grow all through the dry weather, from the shade thus afforded to the herbage; still, if the fern grows too thickly, it, of course, becomes an injury. This, however, with a little attention may be avoided, and the expense of cutting will be recouped by the fern being stored as litter for winter use, thus becoming returnable to the soil as manure.

In some instances, in which the herbage has been poor, great benefit has been derived by simply paring and burning the surface, spreading the ashes, and sowing fresh grass-seeds. I have seen immense improvement effected on hill lands by this simple process.

Medium Grass Land.

Under this head may be classed the principal dairy and breeding lands of the kingdom, which, in many districts, are sadly neglected. Great improvement, however, has been

effected in Cheshire, and in some other places; but large tracts of dairy land are subjected to a continual process of exhaustion of their phosphates and other constituents, by the selling off of the butter and cheese, and the rearing of young stock, without any return being made to the land either by dressing or manuring, except perhaps by the application of the small quantity of manure made by the cattle kept and by pigs, and even this manure is oftentimes misappropriated to the arable lands. This state of things is one that imperatively calls for alteration. It cannot be too strongly condemned; for it is of little use to make agreements with tenants to manure their land, unless they are also shown that it is to their advantage to keep the land in a good state. I have heard it affirmed that if the dairy farmer uses manure for his land it spoils his cheese, and I have little doubt that the cheese is sometimes affected by the use of nitrogenous manures, as can be shown by cheese factors in many districts. But this proves simply that it requires a little alteration in the way of making the cheese, probably a little more time before it is put together, or something of the kind, which Dr. Voelcker could readily explain if the facts of any particular case were put before him; whilst perhaps double the quantity of cheese may be obtained from the same land. Since the introduction of artificial manures the most enlightened and skilful arable farmers have found that it conduces to their own advantage to prevent the land from becoming exhausted—in fact, to get and maintain it in the most vigorous condition: and it is most gratifying to witness the immense improvement that has been made in large tracts of arable land within the last twenty years; and that, too, often when held under the worst of landlords and with bad agreements. I have even met with instances where the bill for artificial manure has been equal to the rent. The reason of this is that the farmer sees that the liberal use of artificial manures is to his own advantage; and so, too, would the grass farmer, were it not that the deterioration of his land is a slower (though not less certain) process, and that the return for improvements is slower also. Hence the landlord should look to this matter, and either be careful to get tenants possessed of capital and intelligence, and give them security of tenure, or assist in manuring the land, charging the tenant a percentage on the requisite outlay.

What I have termed "Medium Grass Lands" must ultimately be attended to, and there is less excuse for their neglect than in the case of the lands treated under the first head, because they will safely justify any judicious outlay, and most tenants would gladly pay interest on works of improvements, as may be seen in Cheshire.

In improving medium grass lands the first remedial measure

must, if they are too wet, be drainage; subsequently, its renovation and manuring. Many of the recommendations given as to the first section apply equally to this. The drains should be constructed in a permanent manner, the principal object to be kept in view being the removal of all stagnant water, which, remaining in the ground, evaporates at the surface, producing cold. I would also mention that I do not think it necessary to put the drains on meadow land so thick as upon arable land, for in the latter case it is necessary, not only to remove stagnant water, but also to get it dry as soon as possible to be able to work it.

A plan should be made of every drain, so that it may be readily found in the event of its getting out of repair. Loss often arises from the neglect of this precaution. The mouths of all outfalls should be built in brick or stone, and have either Amies and Barford's iron outlet-pipe (which I can strongly recommend), or the mouth of the pipe should be grated in some efficient manner, so as to prevent rabbits and other animals from getting into and stopping the drains.

I can add but little to the remarks already made as to the best system of drainage for this kind of land. In some instances the drains may be 24, in others 30 and 35, and in others 40 or 50 feet apart. This can only be determined by the nature of the soil (the resistance it offers to the passage of water), and must be determined by the practical knowledge of the person interested, who would in all cases do well to consult one who is experienced in carrying out drainage-works, and who would not be influenced in any way to recommend unnecessary expenditure. But no drain should be put in upon this class of meadow land at a depth of less than 4 feet. Of the necessity of this I am perfectly satisfied, and I am a convert to the practice, having at first strongly condemned the system of deep drainage. If the subsoil is ever so stiff, the water will find its way to the drains, though in some cases it will be a few years before the drains act thoroughly on very retentive subsoils. Every dry summer, however, will help to bring them nearer to thorough efficiency, while I do not remember to have met with a single instance of shallow draining on this class of meadow land in which the persons interested were not dissatisfied, and wished that the work had been better done.

On this class of land, as with the preceding, it is absolutely necessary, after providing for the removal of stagnant water, and also in case the land does not require draining, to renovate with fresh grass-seeds; and I respectfully request attention to the remarks on this subject farther on in this paper, as it is an important item in the improvement of grass land. It may be advisable, in the case of very wet land, to wait a year or two for the water-grasses to die out and the drains to get into working

order before sowing the new grass-seeds. Some may deem it too expensive to use permanent grass-seeds, in which case recourse must be had, as before, to rye-grass and clover. But this is mistaken economy. It is better to use suitable seed, and if "economy" must be regarded, a less quantity of it than is here recommended; still rye-grass and clover, or either of them by itself, is better than not putting on anything. The sweepings and hay-seeds from the stables and hay-lofts are often advantageously used for this purpose; but I trust my readers are all too good farmers to allow their hay to get full of seed, as this is the greatest of all the injuries to which meadow land is subjected, as I will endeavour to show hereafter. Clover-dust, or the refuse left from shelling clover, may be, and is often, used with advantage, for as the clover-seed seldom ripens simultaneously, the unmatured seed does not shell so readily, and is passed out with the refuse. It, therefore, answers two purposes—the seed left with it in many cases grows, and the dust serves as manure.

Manuring next presents itself for consideration, and this, as already stated, may be carried out with advantage in almost every form. All the refuse of the farm will assist and improve grass land. The chief point to be kept in view is, that where the land produces thick, short, leafy herbage and not many seeds-stems, phosphatic manures should principally be used; while where the land is benty and inclined to produce seeds, more nitrogenous or ammoniacal manures are required. I do not mean that this should be taken in a literal sense, but that these considerations should be kept in mind in preparing mixtures for manuring.

Great harm is often done to permanent pasture by using very stimulating manures, such as nitrate of soda, &c., alone, as the land, being overforced one year, is left in an exhausted state the next, while by the use of bones or special manures (when the latter are properly prepared, of which sufficient care is seldom taken), food is supplied to the plant, which, lasting for some years, has time to give a permanency to the increased growth of the grass, from the increased decay of vegetable matter consequent on the much larger growth of the plant and its roots. My remarks elsewhere with regard to ammoniacal and phosphatic manures must be kept in view. On much of the lighter classes of soils, marl, lime, and salt may be abundantly used, and with advantage.

Some of this kind of pasture land may also be broken up with profit, especially where it burns, and it is often far more valuable as arable land. At the same time I would caution persons who intend to break up pasture on stiff soils, with a view of laying it down to permanent grass, that they may in many cases be thus acting erroneously, unless it is wished to convert it into arable land, in which state it often pays better; it will be

far more advisable to improve the existing turf, for there seems to be something with regard to permanent pasture, especially on stiff soils, that is not obtained in recently laid land. Whether this is attributable to the accumulation of vegetable matter making the grass better, or to something repellant in the soil of a newly laid field, I am unable to determine. Whatever the cause, the grasses do not do well after the first three or four years, for the succeeding eight or ten they appear to decrease in vitality, and subsequently begin again to improve. If the soil is light and in good condition, this dormant state only extends over a year or two; but on very stiff poor soils it takes years before a good permanent pasture is obtained. The most satisfactory reason for this that I have met with is that mentioned by Mr. H. S. Thompson in vol. xix. (p. 259) of the Society's Journal, that "All the gramineæ that are of value for grazing or mowing require a fine tilth or mould as a condition of their successful cultivation. For the first year or two after strong land has been laid down it retains to some extent the porous texture induced by the thorough disintegration which it received in course of preparation for sowing. The second winter, however, generally obliterates all traces of previous cultivation, and the close and sodden state of the land which then supervenes is highly unfavourable to the growth of grass. The land may contain a sufficient supply of all the elements of plant-nutrition, but they are in a crude state, and a constant supply of oxygen is required to promote the decomposition of the mineral and vegetable matters, and their re-combination in forms available as plant-food, so that if air and water cannot easily and quickly pass through the soil in repeated succession, a check is given to nature's under-ground cookery as completely as if the flues were stopped in the farmer's own kitchen, and the dinner had to be prepared without any possibility of lighting a fire. Hence the sudden falling off in the produce of newly laid grass on strong land, and hence the necessity at this critical period for an abundant supply of plant-food on the surface to compensate for the falling-off below." This compact and set state of the land is patent to every valuer who has gone over land with a spade and observed the difference in value between a field that has been only laid a few years and an old meadow. Another writer, the Rev. W. R. Bowditch, quotes Mr. Darwin (vol. xix., p. 225), as showing the accumulation of mould in old grass lands to be due to the castings of worms. Worms have undoubtedly a great influence upon meadow land, and are an assistance in breaking up that peculiarly compact state the land gets into after having been laid a year or two; and this breaking up would continually allow a more free circulation of the air. I am also told that the chief cause

of the falling off in fresh-laid pasture is due to the old system of only putting on annuals, such as rye-grass and clover. These die out during the second or third year, and there is then virtually nothing but the seeds accidentally shed on the ground to grow, and these, being indigenous, are of little value, being the annuals seeded amongst the corn; but if the land is laid with suitable grasses, and their growth is well stimulated by manure, little deterioration will be seen. In this opinion, however, I do not concur, as the falling off happens under the most careful management and with the most abundant manuring, still perhaps not to so great an extent where natural grasses are supplied.

In some of these meadows patches are to be seen upon which stock do not care to graze. These should be gone over in the summer and a small portion mown with a scythe every day. The stock will pick up the portion so mown as it partially withers, and will graze it the second time without further trouble. Salt sown on these coarse patches will also have the desirable effect of making the stock eat it off closely. But whatever measures may be adopted, something should be done to keep those coarse patches down, as they otherwise become worse every succeeding year.

Good Grass Land.

A farm consisting of this class of land is about the most profitable that a tenant can get. It is managed with the least trouble, but judgment is required alike to make the best improvements, and to make improvements of the most value. In this class are to be found the valuable meadows upon alluvial deposits, and those that get flooded from time to time by swollen rivers, the flood-waters being charged with chemical and manurial elements, which become mixed with the natural soil and form very valuable meadows. There are some tracts of land belonging to this section which are naturally fertile. At the same time there is a very large proportion upon which judicious improvement would be remunerative, and which would in some instances double their value, high as that value already is.

The first step towards improvement will be to get rid of superfluous water. The remarks as to the drainage of land in Class 2 apply equally to this section; and, further, there is even greater necessity for the drains to be deep. As much of the class of land comprised in this section lies low, there is often great difficulty in getting an outfall, as the drains have to be carried through the lands of other owners. Any difficulty that may thus arise can be overcome either by the Land Drainage Act of 1861, or by the employment of one of the Land Drainage Companies, whose special Acts of Parliament enable them to pass through the lands

of adjoining proprietors; and if it is not deemed desirable to engage these Companies to provide the funds and construct the drainage-works, they will obtain an outfall upon very reasonable terms. The mills upon the different streams throughout the country have long presented an obstruction to the improvement of valuable low-lying meadows. The occupiers of many of these mills have from time to time gradually dammed up the water to a higher and yet higher level, and though the increased depth of water was imperceptible at the time it was made, yet hundreds of acres of most valuable land have thereby been seriously injured. Great facilities are now, however, given for the removal of objectionable mills, under the Land Drainage Act of 1861, and these facilities have been availed of in many cases, and in some with which I am acquainted with immense advantage, as not only can the mill-dam be removed, but also all impediments to the free flow of water, the cost being extended over the whole area.

I believe that one or two deficiencies in the Act are the reasons why it has not been more largely adopted. For example, the Commissioners are empowered to purchase by arbitration only the water, and not the mill, so that the owner gets nearly as much for the water as water and mill together are worth. The miller naturally asks, of what use is the mill without the water; but if the Commissioners were empowered to purchase the mill as well as the water-power, the cost would be very little more, and the mill might be re-sold to be worked by steam-power. Again, power should be given to the Commissioners to rate mills upon the same stream higher up than the limit of their districts, because these mills derive great advantage from the increased discharge of the tail-water at flood-times, and at present pay nothing for the advantage. Further, the Act should clearly provide that the rates should be levied according to the benefit each proprietor derives from the works. Still, as I have before stated, immense benefit has been derived from the carrying out of the Act, and I would strongly recommend owners of wet lands by rivers and streams to avail themselves of its provisions. It has been adopted in the following places:—

District.	County.
Leadon	Gloucestershire.
Wormbrook	Herefordshire.
Moredon Carrs	Durham.
Wissey	Norfolk.
Llangorse	Brecon.
Longdon and Eldersfield	Worcestershire.
Maxy	Northamptonshire.
Martham	Norfolk.
River Idle	Nottingham.
Dysynny Valley	Merionethshire.

District.	County.
Stainmoor	Somersetshire.
Curreymoor	"
Staunton Common	Herefordshire.
Winterton	Norfolk.
Olredzoy	Somersetshire.
King's Sedgmoor	"
Frodsham	Cheshire.
Northmoor	Oxfordshire.

In some of these districts the land has been improved to the extent of 20*s.* or 30*s.* per acre per annum; and I believe that wherever the work has been fairly and properly undertaken there have been only one or two failures.

Whilst upon the question of draining, I may be allowed to say that I think a mistake is often made in putting the turf upon the pipes in the bottom of the drain. I believe it to be far preferable to put the grass on the top, and to place the spare soil in heaps. In a year or two the earth on the drains will settle in its place, and the heaps can then be carted or wheeled and placed on the top of the drains to fill them up to the level of the adjacent ground; but too much should not be put on at one time, so as to kill the grass. I have seen great annoyance caused by the spreading of the superfluous soil, as in a few years the earth put upon the drains settles and leaves a "grip," or low place, which is very detrimental to mowing and haymaking with machines; while, on the other hand, I have observed the whole of the soil placed on the top, and from its nature it has not sunk to its proper level, and has been a greater annoyance than if disposed of in the other way. Where the turf is placed in the bottom of the drains, grass-seeds should be sown on the top in the following spring, otherwise a considerable loss occurs, especially on high-rented land.

Having removed the water, or in the case of meadows not requiring draining, the next step (as in the cases already treated) will be to renovate with fresh grass-seeds. This will pay well upon this class of meadow and should never be omitted, as the outlay is not much in proportion to the value, and it gives so great a relish to the food that stock will always graze the freshly renovated land in preference to that not so treated. The remarks before made as to manuring also apply to the land in this section, but with greater force, as the returns will generally be greater if the suggestion previously made is kept in view, viz., that where the land is inclined to grow seeds more ammoniacal manure should be used; and that where the herbage is leafy and thick and the land is not inclined to grow much seed, more phosphates should be employed.

On valuable meadow-land it is also desirable to have the

droppings of the animals spread, or removed to heaps, once every fortnight; as when left for a time it destroys the grass, and the loss from it is considerable if the head of stock kept is numerous and the land is valuable. Rooks and some other birds, to some extent, do this spreading gratuitously; still the work is one that will well repay attention.

Having dealt with each of the three classes of meadow-land, I will now proceed to notice a few general points in connexion with the subject and applicable to portions of land in each class.

Most farmers use steam thrashing-machines, and the chaff often lies in the rickyard for some time after thrashing. This chaff generally contains a lot of seeds of weeds, which when taken (as is generally the case) to the foldyard, and afterwards thrown back upon the arable land with the foldyard-manure, occasion great mischief. I would recommend that the chaff be taken at once and spread upon the meadow-land. It need not be rotten for that purpose, and it will improve the meadow-land, where the weeds will decamp after a year or so, and save the propagation of weeds upon the arable-land.

Another point much insisted upon by writers on improvement of meadow-land is the use of rotten dung, and some recommend its not being applied during the summer. I believe I am right in stating that it matters little when it is applied. It will always do good, and may as safely be applied in summer as in winter, rotten or raw; but, of course, the more rotten its state the more in quantity is practically put on in proportion, and the quicker are its effects seen. But Dr. Voelcker has shown that nothing is gained by placing farmyard-manure in heaps to ferment, and that much loss may result from it; therefore, it is better to put it on at once in its raw state, care being taken, if the meadow is to be mown, that sufficient time is given for the long manure to be well worked down before the grass is left for mowing. The whole of the meadow-land should be well rolled and harrowed once every year. The month of February is a good time for this purpose and is a leisure period, but if the soil is of a retentive nature the rolling should not be done when the land is very wet.

The following is a mode I can strongly recommend for improving meadow-land, viz., to haul the roots off the arable land and consume them on the meadows, folding the sheep on a fresh portion every day, in the same way as the light-land farmer consumes the roots on his arable land, giving the sheep some cake, or corn, or dry food. I am satisfied that this is a good plan for adoption on heavy land, and I believe it may be profitably

carried out upon light-land farms; for, if you do take the roots off the arable, you increase the growth of hay, and this swells the manure-heap in return. The use of corn and oilcake is of very great value in improving land: it pays first in the stock, and a second time in the land; and a largely increased number of store-stock may be kept by giving corn and chaff. It is surprising upon what a bare pasture sheep will thrive, if they have a small quantity of corn given them daily.

The greatest evil in connexion with meadow-land—and in my opinion the great cause of its deterioration—is the system of allowing the grass to get old before it is cut, with the view of deriving a heavier crop. The proper time to cut is as soon as the principal grasses come into bloom. If the farmer waits for *all* the grasses to flower, the earlier portion will be getting old; and as soon as the plant begins to form seed the injury to the land and also to the hay commences, and a very serious injury it is. This cannot be too strongly impressed upon farmers. As an illustration, I will mention the fact, that by cutting a portion of a field of clover for hay whilst it is in blossom and leaving the other for seed to ripen, a vast difference will be seen in the crop of wheat afterwards. Therefore, can we wonder at deterioration in meadow-land, when this is not only done one year but continually, and merely for the sake of getting a little larger crop, which, even leaving the injury to the land out of the question, is a doubtful gain, as the aftermath is diminished, whilst the sugar and starch, that are so valuable in young hay, are partly turned into indigestible woody fibre in the old hay. Dr. Voelcker, in a valuable paper (2nd series, vol. iii., Part I.), gives some interesting facts upon the time for cutting clover, which would also apply to grasses. He put out twelve plots, of 1 rood each. These were cut at different times, and showed the result that up to a certain period the crop increased both in weight and feeding qualities; then first the quality began to fall off, and afterwards the weight. The experiment is also interesting as showing the large increase of food gained by leaving the grass to come to a crop, rather than grazing it short with sheep.

Another important point connected with the deterioration from not cutting early is, that the function of plants is to propagate their species, and that therefore their tendency is to produce seed. This being accomplished, the plant, if an annual, dies; and if biennials or perennials, they are to a great extent influenced in some way, or get for a time into a dormant condition whilst recovering themselves. But if this seeding is prevented, the plant tries again the next year; therefore, if the farmer wants hay and not seed, he must take advantage of his knowledge and frustrate the plant's object. For wonderful are the

efforts which plants put forth to fulfil the purposes of nature. Ofttimes, if a plant is likely to die, it will at once blossom and endeavour to produce seed; whilst on the other hand, annuals—such even as mignonnette or wheat—if kept down the first year and not allowed to seed will, although annuals, live on and produce seed the next year. So also with trees. If you have a pear-tree that will not bear, and you cut the roots, the tree, true to nature's instincts, at once bears a crop. The Rev. Mr. Bowditch, in his Essay (vol. xix., p. 247), quoting from a leading article in the 'Agricultural Gazette,' of October 25th, says, "The truth is, these better grasses, suitable to an improved soil, are all of them more perennial in their nature and habits, and are kept so because cattle continually crop them down; whereas poor grasses are refused by cattle, they seed without interruption, and then, having performed the important function of reproduction, they die out." I have dwelt at some length upon this point, as it has so important a bearing upon meadows, and the latter portion upon recently laid meadows especially; and it will decide the knotty point as to the best farming for newly laid land. If it be grazed with sheep, they do great mischief by biting the best grasses into the earth, and thus weakening them by preventing the extension of the roots, which grow in proportion to the plant. Cattle, in grazing, do a similar mischief, but to a less extent, as they do not bite so closely as sheep. On the other hand, if the grasses are allowed to seed, their object in nature is accomplished; the annuals are lost and the rest weakened. Still, to strengthen the roots you must grow top.—See the roots of clover in a field that has been mown twice, and compare them with those in a field that has been grazed. Therefore, my belief is that the proper course is to mow the fresh laid meadow, taking care to cut it before the grasses even come into blossom, and thus continue to cut in the first year, using the produce as green food.

While upon this part of the subject, I would mention that much improvement may be made in meadow-land by care in grazing. Too many sheep should not be kept; where practicable, I would suggest small enclosures, so that the stock can be frequently changed, and to graze the enclosures alternately with cattle, horses, and sheep, taking care to graze close during the months of May and June to prevent the grass running to seeds. This may be done by the use of corn and cake. This, I am satisfied, is best upon inferior meadow-land; but it may be open to question, as to prime land, where the stock will eat the whole of the grass, whether it is not more desirable to get the land covered early in the season with herbage, so as to prevent it burning up by keeping the land cool. This I have

often heard recommended by graziers who have the best land; but I believe it to apply *only* to the best land, as on other land the stock do not like the grass when it gets old, and will not eat it unless you either mow it or sow some salt upon it.

Mr. Thompson, of Badminton, the Duke of Beaufort's agent, in a paper he read to the Kingscote Agricultural Association, relates an experiment made fifteen or sixteen years ago that came under his own inspection. He states that when he let Walls Court Farm, near Bristol, to Mr. Alderman Proctor, of the firm of Messrs. H. and T. Proctor, the well-known manure manufacturers, there was a piece of very wet sour grass land, considered too bad to be brought to bear good herbage by simple draining and manuring. The option of breaking it up was consequently given him by the terms of the agreement. Before doing so, however, he said he should like to try the experiment whether it was possible to permanently improve such land without breaking it up. The draining was done most effectually in the winter, and during the following spring it was harrowed, bushed, and dragged until it was scarcely possible to tell whether it was a grass or arable field. He next gave it a dressing of artificial phosphatic manure, and by midsummer the clovers and other fine grasses had begun to show themselves. As there was very little to cut it was merely skimmed over, and in the following autumn he gave it another dressing of artificial manure, and during the following winter and spring a thorough good dressing of farmyard manure. The effect during the succeeding summer was something wonderful. He remarks: "I assure you I don't exaggerate when I say that I saw as fine a crop of grass cut on that land as on any I have ever met with, both as regards quality and quantity. The value of the land was in that short time permanently raised from 10*s.* to at least 2*l.* per acre. It has been farmed ever since exactly in the same manner as the rest of the farm, and after fifteen years' cropping still maintains the character of being a piece of excellent pasture land."

Irrigation is the next important point to be considered. This is capable of being made far more beneficial and more perfect than even where it is at present adopted. There are three or four different kinds of irrigation. The first and most important is that of irrigation with sewage; secondly, with water by a regularly arranged system of ridge-and-furrow; thirdly, by the catch-water system on the sides of hills and hilly fields; and fourthly, by the use of floodgates on brooks, to throw the water over the meadows when it is thick and muddy from floods. Irrigation by sewage has long been a difficult problem, and is beyond the scope of this paper; suffice it, therefore, to say that the system gains ground and that more attention must yet be paid to it, for

in a few years Local Boards of Health will undoubtedly be prevented from sending the sewage into and polluting the rivers when there is land available below almost every town for its profitable reception. This sewage can be applied according to circumstances. I cannot do better than describe the Edinburgh water-meadows, in the examination of which I spent the greater portion of a day in the summer of 1866. These meadows are principally laid out on the ridge-and-furrow system; and the water-bailiffs informed me that each occupier had the use of the water once in every week or nine days, and that they generally turned it upon the portion last cut. I observed in some places that the grass grew remarkably coarse and strong, and upon examination I found it to be couch-grass (*Triticum repens*). This, the bailiffs said, many of the occupiers preferred on account of its rapid growth; the bulk was larger than that of the finer grasses, whilst it did not scour the animals so much. Amongst the occupiers with whom I had the opportunity of talking was one who gave me much information. He said that he remembered the meadow where we were standing a wild common on the sea-shore only thirty years previously; on it there were generally encampments of gipsies and other wanderers; people were afraid to cross it after nightfall, and the land was of no value in an agricultural point of view. During the thirty years this land had so improved in value that some of it had been let by auction for as much as 42*l.* per acre per annum. He had not given quite so much for his portion, which was four-fifths of an acre, but he kept four milch-cows and a pony upon its produce. This may appear incredible to many. I mention it to show to what extent the improvement of meadow-land may be carried. This 42*l.* rental, at 30 years' purchase, would give 1260*l.* per acre as the value of land that a quarter of a century before was worthless. Croydon and other places may also be cited as illustrating the value of the application of sewage-manure to grass land. But I proceed to notice the ridge-and-furrow system, which is largely adopted in some parts of the country and with very valuable results. The greatest objection to the system is the expense, the cost of properly laying out the land being often as much as 60*l.* to 80*l.* per acre; but, after it is effected, it is certainly a valuable acquisition to a farm. Much mischief is often done by leaving the water too long upon the meadows. When a film covers the water it should be turned to another part. This film generally comes upon the water in a week or nine days. If possible, just before frost sets in the farmer should turn the water on and let it remain till the frost disappears; but he should avoid turning it on or letting it off during severe frosts.

The catch-water system I must call most attention to, as it

can often be adopted at an outlay of a few pounds per acre, being formed on hill sides or sloping meadows. Wherever water-cresses are to be found in a stream, the water will contain lime and be good for irrigation. The streams running from the farm-buildings should in all cases receive more attention than is now given to them, and be led to the meadow land, where a little labour and attention would be abundantly rewarded, as almost all water will do good. In many cases, however, the water is left on and starves the land. The better the water, the longer it may be left on with impunity, and even with advantage.

The fourth system of irrigation above enumerated is a very important one, and in flood times, when the waters are swollen, and thick and muddy with soil and manure from high lands, the neglect to turn these streams over the meadow land is unpardonable. This may sometimes be done by providing a flood gate in the brook, and often the only trouble or expense is the first turning the water out. I have seen wonderful improvements made by this simple proceeding. I cannot do better than quote a few passages from a paper by Mr. Pusey, M.P. (vol. x.), who shows (p. 474) that two acres of water-meadow land kept 73 sheep for five months, or 36 sheep per acre; and in summing up (p. 478), he says, "I have proved what I set out by promising, that money expended on catch-meadows may pay 30 or even 50 per cent., and as the work is done by contract, there can be no error as to its cost. In any branch of manufacture, to prove this fact would be to ensure its immediate accomplishment. If such a profit were likely to arise from cutting through the isthmus of Suez or Panama, the canals would be dug at once. Much more persuasion I know is needed in stimulating landlords to the improvement of even English estates. I will only say that it is mainly these catch-meadows which enable me to keep a flock of 550 ewes, and winter their lambs also, on nearly the same farm on which my predecessor kept 170 ewes and their lambs."

Messrs. Wheeler and Son, well-known seedsmen, of Gloucester, have made what I believe to be a very important step towards improvement in laying down to permanent grass, by supplying to each geological formation the grasses suitable for that formation. They publish a list of those they consider suitable to each. This may appear to the superficial observer a matter of little moment, but when it comes to be well considered it will be regarded as of vast importance. We know that trees and large plants thrive best on those soils which contain their constituent parts in the greatest abundance, and the neglect of similar considerations as to the grasses, may, I think, account for the difference to be observed in the meadows of the different forma-

tions. At all events, a perusal of Wheeler's 'Book on Grasses' will repay a study by any one interested in the subject.

It may here be advisable to notice a few of the grasses suitable for renovating meadows; but as our space is limited, this notice must necessarily be brief.

Rye-grass (*Lolium perenne*).—This is a grass well known, and valuable for mixtures, as it does well on most soils, but the *evergreen* is more to be recommended than either Pacey's or the perennial; for it stands better the frost in winter and the drought in summer, but I scarcely know how to recommend it in preference to the Italian rye-grass (*Lolium Italicum*) for meadows; for artificial pastures the latter is undoubtedly preferable. For renovating, 2 lbs. may be used in the mixture.

The Cock's-foot (*Dactylis glomerata*) is also a very valuable grass, as it soon arrives at maturity; it is most suitable for the medium soils, and should not be sown by itself, but mixed with other grasses. It is also a good grass for sowing in orchards. The produce is very great, and the quality highly nutritious, 1 lb. may be used in mixture for renovating; increasing, or diminishing the quantity, according as the soil runs *deep and good or thin and light.*

Timothy, or Meadow Cat's-tail (*Phlœum pratense*) is another good grass for renovating mixtures. It flourishes best on the moist soils, but may be used on all. It is a nutritious grass, but a slow grower. About ½ lb. per acre will be sufficient to use in renovating mixtures.

Meadow Fox-tail (*Alopecurus pratensis*) is another valuable grass for renovating mixtures. It takes a few years to come to perfection, but it is then an early and nutritious grass, and is to be found in most of our valuable pastures. It is a good kind for grazing purposes, and is also good for the aftermath, as it grows quantity as well as quality. It is best adapted for medium soils, but may be used in mixtures in most situations, at the rate of ½ lb. per acre.

The Golden Oat Grass (*Avena flavescens*) is a desirable grass for mixture, especially for light dry soils. It does not run quickly to seed, and produces a quantity of herbage, but if allowed to get old, is of little value; it may be used at the rate of ½ lb. per acre.

The Sweet Vernal (*Anthoxanthum odoratum*), is another grass to be recommended for mixture for renovating, as it is very early. The herbage produced is, perhaps, scanty, but is valuable mixed with others, as it principally gives the scent to newly made hay. It is more especially to be recommended for sheep pastures, and does for most soils, but, perhaps, from ¼ to ½ lb. will be sufficient for renovating purposes.

Wood Meadow Grass (*Poa nemoralis*), is also a good grass for orchards or places shaded by trees, as it thrives where other kinds will not grow, and produces a good deal of superior herbage. ¼ lb. will be sufficient for mixtures.

Meadow Fescue (*Festuca pratensis*), is one that should not be left out of the mixture, as it is adapted to most soils, and produces a quantity of grass. It is extensively found upon our fatting pastures. Most kinds of stock are fond of it, but it does best on the richest soils. 1 lb. per acre may be used with advantage.

Crested Dog's-tail (*Cynosurus cristatus*) may also be used in the mixture to the extent of ½ lb. to the acre. There is not so much to be said in favour of this as of most of the other kinds. It is more commonly known as the bent, although, I believe, the term "bent" amongst farmers implies any grass seed-stem.

There are several other grasses which may be used with advantage, together with red clover, cow-grass, white or Dutch clover, and trefoil, as circumstances will admit; but I do not attach so much importance to the use of clovers for renovating, as I should for laying down to permanent pasture, and as the laying to permanent pastures do not come so prominently forward in this Essay as *improvement* of grass land, I shall not further notice them.

Most of the kinds of grasses mentioned can be had at from 9*d.* to 1*s.* per lb., and a mixture of 6 to 8 lbs. per acre will be sufficient for renovating.

Before concluding this Essay it may be well to mention that the most difficult portion to treat, is that of manuring. It is one on which I have had a good deal of experience. I have seen bones applied and produce no good whatever; and, on the other hand, I have seen them used with immense advantage. On the other hand, I have seen guano used and produce a splendid crop that year, while the year following the crop has been worse than before the guano was applied.

It is impossible to give any definite rules for guidance without knowing the kind of land to be manured and other attendant circumstances. Therefore I can only reiterate what I have before stated, that in proportion as the land is inclined to grow benty or stalky grass, inclined for seed, ammoniacal manures should be used; if the land produces thick short leafy herbage, then phosphatic manures must be applied; I cannot do better than conclude in the words of Mr. Thompson (vol. xix.): "I would state my decided conviction, the result of twenty years' experience, that money judiciously laid out in the improvement of grass land brings in a more certain return than where expended in the growth of corn. It is not, as in that case, liable to great

injury from an unfavourable seed time, from severe winters, from wet harvests, and the various minor vicissitudes to which grain crops are subject; and if in a very growing season, more grass is produced than the cattle can consume, it is always possible to convert it into an additional haystack, a piece of furniture which, however bulky, is never found to incommode the cattle in their winter quarters."

XII.—*The Retention of Moisture in the Soil of Arable Lands in Dry Climates.* By ROBERT VALLENTINE.

PRIZE ESSAY.

THE most essential step towards causing the retention of moisture in arable land is to obtain a good depth of well-cultivated soil. All clay soils, and all such as rest upon clay or have a hard impervious pan or subsoil within a few inches of the surface, require in the first place *draining*, which must be followed by deep cultivation of some sort when the ground is sufficiently dry to crumble into pieces.

It certainly at first sight appears paradoxical to speak of draining land as a means of enabling it to retain moisture; but when the various effects which drainage has upon land are duly considered, there is no real absurdity in the matter. Without considering it necessary to enter fully into the theory and practice of drainage, I must mention a few leading points on the advantages of draining all impervious subsoils.

The great object of draining is to relieve the soil of an excess of moisture, so as to allow rain-water to filter through the land instead of standing too long, or running over the surface. A good deal of land when being drained is found to have a comparatively dry subsoil to what the surface has, and so dense as to prevent water readily passing through it. After draining, however, air passages are formed, and water follows at once when there is any pressure from the surface. Thoroughly drained well cultivated land allows any excess of moisture to pass away during wet periods, whilst it also has the power of retaining a store of moisture for periods of drought. All ordinary root-crops thrive best with a good supply of moisture, and even oats and barley not unfrequently suffer from drought.

The best naturally fertile soils are of such a texture that they require no artificial draining, and seldom become either too wet or too dry. Light sandy soils, on the other hand, have too much natural drainage, and are chiefly a trouble from retaining too little moisture. Clay-loams, by draining and superior culti-

vation, are rendered well adapted for root crops, though such soils at one time were considered quite unsuitable for them.

After the drainage of such land as requires it, the next most important step for retaining moisture is *deep-cultivation.* Whether this may be accomplished by steam or horse power is immaterial, so that the operations are carried on at the proper time, when the soil is dry, or comparatively so. To manage this always is next to impossible; but to be able to do so generally requires no more than a full strength of horses or steam properly applied. The labour of the farm must always be kept well forward.

Autumn cultivation is essential to the proper preparation of the land for root-crops. The foulest and stiffest fields should be first attacked. If the harvest is moderately early, cultivation may generally be commenced in the end of August, and should be continued as much as possible to the end of September. A month's ploughing and scarifying with all the strength of the farm will usually be sufficient to clean any such fields as require it on any farm moderately well managed previously. Foul land should not be very deeply ploughed, as it cannot be dried nor shattered into pieces so soon as when ploughed with a furrow of moderate depth. No horse scarifiers or grubbers I have ever tried, or have seen used, seemed equal to the task of thoroughly breaking up stiff foul land. Horse-power is unable to draw an implement taking a width of several feet, and sufficiently deep at the same time to reach the roots of couch, which usually go four, five, or six inches deep. A great many, however, persevere with grubbers for breaking up foul land, and naturally enough contend that what they do is right. Grubbing in the first place appears satisfactory, from getting over the ground faster than ploughing; and the land also appears to be in about as forward a state towards destroying couch, &c., as ploughed ground after being scarified. In most instances, however, foul land merely grubbed two or three inches deep, and very commonly missed altogether at the foulest spots, is not cleaned, but merely checked for a time. I know farms where grubbing is the order of the day—autumn and spring. Still the land is foul, though submitted to an enormous amount of surface scratching almost every year. The smashing-up system by steam is a very different thing, as the power is sufficient to reach a proper depth, and leave hard clay soils in large lumps, which no ordinary rain can search through, but wets for a short time only, and suddenly becomes dry again, and so dry too, as to destroy couch and other weeds by mere absence of moisture. Horse-grubbers leave the enemy in the subsoil; it soon revives again, and in fact would continue to live

for a hundred years with merely superficial scratching. On the peat soils of Lincolnshire, or the very lightest description of soil anywhere, horse-grubbing does at times succeed; but what I mean is, that no cultivation can be good unless the object aimed at is accomplished, and certainly this cannot be when the root of the evil is not reached. Land farmed in the usual four-course rotation should seldom require much labour for merely cleansing, save every fourth year; and if this is managed properly, there ought to be very little couch left during the intervals between one root-crop and another. A great deal of horse-labour may, however, be saved by forking out odd pieces at all times when they make their appearance.

Foul clay, or stiff loamy soils, can be cleaned only by being broken up, and afterwards worked when dry. Where there is only horse-power, the plough is the most efficient implement to use *first*, and the grubber afterwards as frequently as possible. After ploughing, a few days only should elapse before the grubber is used; and this again should be used every few days, to turn about and dry the soil completely. One foul field on a farm in ordinary dry seasons may be cleaned in September, if ploughed at once, five or six inches deep, after harvest, and then kept moving frequently about. The land at this season is usually dry, both surface and subsoil; and with the heat of the sun, September is *the* month of the year for most effectually killing couch on any description of land. It may frequently be seen that more is aimed at than can be well accomplished; more may be ploughed than can be turned over afterwards so often as is required. When this is the case, the cleaning process is sadly mismanaged, and much more harm than good is too often the result. Foul land but once ploughed, and perhaps only once or twice imperfectly scarified, may be left in such a state that all the previous labour is thrown away, and more labour is again required in summer than if the neglected field had never been touched till the longest day. After September there is seldom much chance of killing couch by the heat of the sun, so that unless plenty of strength be applied during the few weeks immediately after harvest, the attempt at autumn cleansing too frequently ends in disappointment. If what is called an afternoon farmer begins ploughing in spring, there is all the summer before him, every succeeding month getting hotter and hotter; therefore if the land cannot be cleaned in May for a green crop, it has a chance to be managed sometime before harvest. By such a plan, however, it is a mere accident to get the soil into a proper state for root-crops. Before the land can be cleaned it must be dried, and if deficient of moisture it is not likely to be suitable for cropping.

Presuming that a farm is in such a state of cleanliness that there is no real mass of couch anywhere, autumn ploughing should be as deep as the nature of the soil will admit of. If the subsoil is very poor or stubborn, subsoil ploughing, or stirring, is preferable to a very deep furrow, which would bring too much inferior soil to the surface. Subsoiling always does good if the land is quite dry, or at least dry enough to crumble to pieces as the plough works through it. Like every other operation, however, subsoiling may be attempted at a wrong time, and mischief naturally follows. I have erred in this way more than once, and have seen frequent instances of failure resulting from subsoiling when the land was too wet, and after being cut up by the share fall closely down again and made a mess of by the horses' feet. Land can seldom be suited for subsoiling after the middle of November, and not often so late in the season as this. Yet how many have continued this work during the whole winter?

With a good strength upon a farm, one field might be subsoil-ploughed every ordinary autumn, until the whole of the arable land has been stirred to a depth of at least a foot. After this the depth of the surface furrow should be increased gradually at every rotation for green cropping. It is quite an exception for land to be ploughed deeper than from four to five inches. Now, instead of this, if the soil be deepened to eight inches by degrees, the increased power it will have for *retaining moisture* will be very great, and the chance of obtaining heavy crops of all kinds increased in like proportion. It must, however, be assumed that the due manuring of the land must also be attended to.

Autumn dunging for green crops on all clay soils or stiff loams is also much to be recommended. All soils dunged in autumn or winter retain moisture better for use in dry weather than such as are undunged. Indeed, there are some soils so very retentive of moisture, after winter manuring, that it would be better avoided, especially if the land contains any couch which requires getting out in spring. Any good system may be abused at times, and there is nothing much worse than dunging foul land at any time. There are many good plans carried out systematically, such as subsoil ploughing, deep ordinary ploughing, dunging in autumn, &c., when every circumstance is suitable; but on the other hand, any of these operations may be carried on improperly,—loss, coupled with disappointment, being the natural result.

Light sandy soils, and all such as are usually known by the name of light soils, should not, I think, be dunged in winter. I have seen better crops of roots grown after dunging in June than

after autumn-dunged land, the weight of dung applied in both cases having been the same.

Many light soils have a most voracious taste for manure, and appear to digest it so rapidly that it is unprofitable to feed them long before expecting them to do some work. Even loamy soils dissipate manure in a rather quick and mysterious way.

Mr. Lawes's experimental plot, dunged every year at the rate of 13 tons of dung per acre, does not appear to have much increased in fertility, neither as judged by the crops it has carried nor by finding the elements of the dung contained in the soil itself. When neither the crops nor the drains, so far as known, have carried away the manure, it must be concluded that a good deal has been lost by evaporation.

According to Liebig, the subsoil cannot be manured, therefore loss from the surface by washing downwards could not take place. In the main this may hold good; but when it is so well known that drain-water is frequently discoloured and has been found to contain the elements of manures washed from the surface, through the pores of the soil, surely the soil itself must retain something when acting as a filter. Indeed this property of most soils has been proved; and I am inclined to think that a large proportion of manures is actually washed away by rain-water passing through the soil, whether by artificial drains or on such soils as naturally drain themselves. At all events, as light soils do get rid of manure very quickly, in some way or other, it is advisable to apply the dressing in spring or summer, rather than early in autumn. The deeper the land is cultivated, the more manure, as a rule, it requires; but this is, of course, soon repaid by the extra crops which it will produce.

Long fresh dung should be applied to the stiffest description of soils, and this only in autumn. Short rotten dung is best for both heavy and light soils, for root-crops, when the manure is applied just before the seed is sown. Green dung, without fermentation, keeps the land too loose and permits moisture to escape too rapidly.

The application of lime or marl to light sandy soils enables them to retain moisture. Gas-lime, which has been mixed with any kind of refuse-soil for some time, is also useful for light soils. Gas-lime, in a fresh state, at the rate of 10 to 15 quarters per acre may be safely applied in autumn to land intended for root-crops the following summer. Soap-boilers' refuse is also very good. Burnt-clay ashes, applied to any soil, have a good effect. It is seldom, however, that these can be economically taken from the heavy-land portion of a farm and applied to the lighter.

For the very lightest and poorest sandy soils, in which it is so difficult to retain moisture, there is nothing so useful as clay or

marl. Without this, indeed, every other attempted method of improvement may be nearly thrown away. Calcareous marls are much the best for all sorts of light soils of a sandy nature. Marl not only acts upon the soil, mechanically changing its texture so that it will retain more moisture, but also partly as a manure and a conservative of every other fertilising substance, such as dung, sheep's droppings, or any artificial manures which may be applied as top-dressings. There are clays which appear alike to the eye, but possess very different manurial values. The most calcareous marls readily shatter to pieces after having been exposed to frost in winter, or after having been dried in summer, and crumble to pieces when wetted. A few drops of muriatic acid applied to the best marls make a considerable effervescence at once. Such marls or clays as neither slack to pieces after exposure to the weather, nor effervesce on the application of an acid, should be avoided. It frequently happens that clay-marls of a good and of a bad kind may be found within a few yards even of one another. I have seen some very bad clay applied to sandy soils—some of the pipe-clay, or porcelain, kinds, which never mix properly with the soil, but are found in fragments, as plastic cakes, or hard knobs, according to the weather. It is a great error and a great loss when an expensive improvement is attempted with a bad clay. When good marl cannot be found within a moderate distance from where it is wanted, chalk, or what is locally termed hurlock, may be used as a substitute. Lime on all but the poorest sands may also take the place of either marl or chalk. I have tried lime, gas-lime, and marl in the same field, one against the other, and found the results very similar. On some poor ground which had once grown furze, gas-lime made the most rapid improvement. Even after well dunging, and also applying artificials, some ground failed to produce half a good crop, year after year, until gas-lime hot from the retorts was used; then the following crop was really better than that of the rest of the field, and every crop for years has succeeded very well. The cost of filling, carting, and spreading marl, is generally about equal to buying lime; but various circumstances should guide any one as to the probable comparative cost and ultimate results.

I have seen some mere barren sand converted into a pretty good soil by first trenching 18 inches deep, then marling, and afterwards following up with plenty of manure. True, the various improvements cost as much as the land in its once barren state; but this does not affect the question in the mean time, as it is not one of cost, but how moisture is to be retained. I may add, however, that the land referred to carries average crops, and is so much increased in value as would cover every expense, looking from a landowner's point of view.

This essay is not intended to refer exclusively to any class. A tenant-at-will might say it is perfect nonsense to tell him to subsoil, trench, marl, lime, or carry out other expensive improvements. A landowner might, on the other hand, say to a tenant, let us go shares in such and such improvements, both in the matter of cost and advantages. There must be some kind of standard to aim at, at all events; and our aim is simply to suggest how land may be improved by the various plans which have succeeded.

Moisture plays such an important part in the growth of every crop, that neither corn nor roots can thrive without a moderate supply. Our summers are frequently so dry, that the growth of root-crops especially is attended with much difficulty, more from the want of moisture than from any other cause.

By autumn-cultivation turnip-soils require scarcely any more labour in spring or summer, so that moisture is retained in the land, instead of being dissipated by frequent ploughings during hot drying weather. No operation is so much calculated to lose moisture as ordinary ploughing, therefore scarifying or grubbing is much better, whenever this can take its place. In times of unusual rains it is frequently a good plan to plough instead of scarify, with no other view than that of getting the land somewhat dried so as it may be worked into a suitable mould for swedes or mangolds. However, most land, well cleaned and cultivated in autumn, should seldom require but one ploughing in spring, and frequently this also may be dispensed with. The lighter the land is, the earlier it is worked in the spring the better, so that it may be left unworked for some time before swedes are sown.

For mangolds there can be little rest allowed between the working and sowing of the seed. Soils very retentive of moisture should not be worked very early in the spring, neither ploughed, nor by any means scarified. When not dry in the bottom of the furrow at the time of stirring, and especially when this operation is followed immediately by a drenching rain, much injury ensues, and sometimes the turnip-crop is almost lost from what seems only a slight accident.

The application of dung during hot summer weather, for the turnip-crop, is a frequent cause of the loss of moisture from the soil. When dung has to be applied, this cannot be altogether avoided; but by attention to some particulars the loss may be greatly reduced. When turnips are to be grown on the *flat* surface on light soils, all the working which the land requires, after being cleaned and reduced to a fine tilth, should, if possible, be completed some weeks before the seed is sown. If it is intended to sow swedes at the beginning of June, the dung should be applied and ploughed in by the middle of May. If swedes are to be grown on the *flat* surface on any soil, it is advisable that

the dunging—when dung is to be used—should take place and be ploughed in as long before the seed is to be sown as possible, consistently, of course, with being well done when the land is dry enough. When it is intended to grow turnips on ridges (by turnips is meant to be implied swedes and all other kinds of turnips), the land should be prepared some time before the dung is applied and the seed sown; the intention in every case being to retain the moisture in the soil by allowing it to be at rest, instead of turning it about during hot weather to dissipate the moisture just before the seed is sown. On farms having a small extent of green crops the strength is seldom sufficient to dung, plough, and sow the seed on the same day; but when any extent above forty acres is sown, the available strength of men and horses should be able to carry on every operation simultaneously. Some turnip-sowing machines roll the land as they sow the seed, and cannot do one thing without doing both. This is rather a misfortune sometimes, as the ground may be in a most desirably moist state for the reception of the seed, but this cannot be sown on account of the roller clogging. By delaying until the ground is dry enough for the roller to work, the soil becomes *too* dry for the seed to braird, and thus a crop may be lost, or partially so, from not being able to sow without rolling. Every machine or drill should be so constructed that it can be used without being affected by the state of the land, or during showery weather. When land is comparatively dry, turnip-ridges should be rolled the same day as the seed is sown; but it may be better to delay the rolling for a day or two afterwards, according to the kind of land, state of the soil, weather, &c. Sometimes the land is better unrolled altogether; but, unless in unusually wet weather, the roll should certainly be used to press the soil together and retain the moisture.

It has frequently been a matter of discussion whether turnips should be grown *on ridges*, or on the *flat surface*. I think it would be useless to attempt to enter largely upon this subject. On dry sandy soils, in dry climates, moisture is certainly retained better by sowing on the *flat* than on *high ridges*. A great deal depends upon how the various operations are conducted. By slovenly, or, at least, by dilatory turnip-growers, more moisture is allowed to escape during the preparation and sowing of turnips upon the *flat*, than is lost by a better course of management when the cultivation is on the *ridge* system. The ridges may generally be so rolled down as to be nearly meeting, with a depression between them of only a few inches. In such case there is little more chance for moisture to escape than by the flat system. The ridge system allows the manure to be placed more directly under the seed than by the broad-cast method. It also allows of a much

cheaper and more efficient system of cultivation. However important a root-crop may be, it is not more so, than that the land should be thoroughly cleaned, well stirred, and completely cultivated, during the growth of the crop which is to be the foundation, and, by good cultivation, the very ground-work of three or four crops afterwards. When roots are grown on the *flat*, no deep cultivation can take place. A mere surface-scratching is about all that can be done, or at least all that is generally done. Where the *flat* system of growing roots is adopted, the land is seldom kept so clean, through a rotation of crops, as where ridging prevails. Many people contend that heavier crops *may* be grown on the flat than on ridges, still it is well known that heavier crops have generally *been* grown on ridges when the system has been properly carried out.

When artificial manures alone are used for turnips, there is less chance of losing moisture than when dung is applied. Even by ridging there is a very short exposure of the soil to the weather. No damage is done by the cart-wheels compressing the ground either, in the hollows just where the plants are to grow. When the land is exactly in the right state for working, a large extent of ground may soon be sown. Artificial manure may be applied on the level surface, and the soil then ridged up, when it contains much more moisture than would be suitable for dunging and poaching about with carts. One man, with a change of horses, can ridge six acres a day, and so on in proportion, according to the extent of the farm or the breadth to be sown. To accomplish six acres a day of dunged land, about fifteen horses and nearly thirty people would be required. On rather heavy soils it is very difficult to catch the right time for dunging, without injuring the ground, so it has turned out that a good many farmers use more artificials than formerly for the root-crops, and apply the dung elsewhere. Dunging in autumn or even in early spring would prevent the necessity of dunging when turnips are sown; but few people, by some bad luck or other, are able to do every thing at the right time. Indeed there is rarely sufficient dung on a farm in autumn to manure much of the land intended for green crops the following summer. Dung may be applied as late as the beginning of March and ploughed in for root-crops, such as swedes and turnips, sown in the end of May or any time in June. For mangolds or potatoes the dung should either be applied in autumn, or when the crop is planted in spring. Long-straw dung has not time to rot in the land, so that it may mix well, if only ploughed in a few weeks before the ground requires moving again.

It is certainly a contradiction of terms to say that those soils which are classed as light are really the heaviest, bulk for bulk.

Peaty soils are an exception; but the more sandy a soil is, the more dense it is, and the heavier it weighs, whilst the more clayey so much lighter it is. Almost pure sand weighs nearly twice as much per cubical foot as water. Porcelain or pipe-clay is only about one-and-a-half times heavier than water. These proportions vary, of course, according to whether sand or clay predominates, also as to the state of moisture and porosity influenced by cultivation and manure. On digging out a cubic foot of a clay soil at the surface, and another from the subsoil, the upper foot, being more porous, was lighter by some pounds; and if water were added to the upper soil, the space occupied by a foot moderately dry, would be increased; and, as water is lighter than soil, a foot of dry clay would be more than a foot of wet clay, and would thus, space for space, be lighter. Sand is so dense and fits so closely together that there is very little space left for the retention of moisture; it therefore neither sensibly expands nor contracts by drought or moisture. Clay, on the other hand, if saturated to its fullest power of retaining water, will contract quite a tenth part by the ordinary heat of the sun. Any one may observe this on clay soils in a dry season, when a bare field will be cracked about in all directions; the spaces between the cracks, not a foot perhaps, having such large openings at times that a walking-stick may be thrust down several feet. This at once exemplifies the porosity of clays, although they appear when wet to be dense and heavy. No one ever saw cracks in a field of sand.

Many interesting experiments have been made for testing the percentage of water which dry soils would absorb and retain without dripping. Strong clay, when thoroughly dry, has retained 50 per cent. of water. Peat, which is the skeleton of land, absorbs much more than half its own weight of water. Pure sand will not retain even 5 per cent. It may well be acknowledged, therefore, that such and such kinds of soil are dry and others retentive. Sandy soils, after being wetted, part with their moisture very rapidly, whilst clay, on the other hand, not only retains more moisture in the first place, but keeps it with great pertinacity afterwards. Some of the early chemists thought it a good test of the fertility of soils to ascertain the percentage of water they could absorb, and the length of time they took to dry again. Such tests, however, are now abandoned, but the idea was pretty good upon the whole. If our stiffest clays could be completely dried, they would indeed have an excellent chance of being fertile when moderately moistened again for a crop; but there is no such chance in general for a field being dried so that the soil would absorb 50 per cent. of moisture; hence the comparative fallacy of artificially drying a portion of soil only, and

comparing the properties of this with soils in their natural state.

It still holds true, however, that the better and deeper any ordinary land is cultivated the more porous it becomes, and the more is its capacity increased for retaining moisture—though not in injurious quantity—for yielding a more regular supply than shallow-ploughed land, or than such soils as allow the moisture to merely run over their surface.

It has been thought by some strong advocates of steam-ploughing, that if the land were stirred to a good depth, scarcely any drainage would be necessary. In some seasons this might suit well enough, no doubt; but in very wet years there might be too much of a good thing. I have certainly noticed, more than once, that land stirred by horses, even to the depth of a foot, and left very rough by crossing the first furrow with the subsoil plough without a mould-board, has kept remarkably dry all the winter, and the drains discharged no water whatever. A foot deep of soil, crumbled about at the bottom and lying in large lumps at the top, does certainly receive a large quantity of rain without appearing to be very wet. Evaporation seems to go on almost all the winter from land lying with a rough surface. It must be clear that land that will absorb a large quantity of water, and retain it without being injured, must be capable of sustaining crops better during dry summer weather than such soils as are so close as to admit of little moisture by their want of porosity. In 1864 the drought was so great that turnips almost universally failed unless on very deeply cultivated land. In 1860—a very wet summer—many crops were failures from an excess of surface moisture, induced by too shallow cultivation.

"The retention of moisture in arable soils in dry climates," can only be accomplished by a succession of labour and precautions. There is no royal road to the fountain of waters, but every one must plod on and try to find the way by the best means within his reach.

At all events, if the weight of root-crops throughout the country were *doubled*, the wealth of the nation would be vastly increased; and with better cultivation and more manure, this I do think is quite possible.

Burcott Lodge, Leighton Buzzard.

XIII.—*On the Chemistry of Silesian Sugar-Beets.* By Dr. Augustus Voelcker.

The sugar-beet, like the common mangold-wurzel, is derived from the *Beta cicla* and *Beta vulgaris*, biennial plants, which grow wild near the sea-shores of south-western Europe.

There are numerous varieties of beets, differing from each other greatly as regards the shape and colour of their leaves and succulent roots, and to some extent also as regards their habits of growth. The roots of some varieties grow partly underground, partly above ground, whilst the bulbs of others are developed entirely below the soil. The latter varieties are most highly esteemed for their sugar-producing qualities.

All the varieties of sugar-beet may be considered as belonging to one of the following five chief sorts:—

1. The French or Belgian sugar-beet.
2. The Quedlinburg (German) sugar-beet.
3. The Silesian beet.
4. The Siberian beet.
5. The Imperial beet.

A brief description of these five varieties of sugar-beet may not be out of place here.

1. *The French or Belgian Sugar-beet.*—This is a slender fusiform white root, close in structure, and white in the flesh. It grows underground, with no tendency to become necky. It throws up, comparatively speaking, few and but small dark-green leaves, which lie flat upon the soil, and seldom spread over a space of more than six inches round the root. The leaves have but few whitish-green ribs, with here and there a reddish tint. The central leaves are dark-green, and generally red-ribbed.

It is an excellent sugar-beet, and recommends itself by producing little waste, inasmuch as it does not throw out small fibrous roots, and is very small in the head.

2. *Quedlinburg (German) Sugar-beet.*—A spindle-shaped, smooth root, growing generally underground, with a bright red or rose-coloured skin, and fine white, or reddish and white, marbled flesh. Leaves dark-green, with red-coloured ribs, and short red and green-striped petioles. The leaves spread flat on the ground, and occupy but little space round the root. It is rich in sugar, and gets ripe about 14 days before any of the other sorts.

3. *Silesian Beet.*—The Silesian beet is a pear-shaped root, white in the body, and light-green on the top, which grows above ground, and is very broad. Flesh greenish-white; stronger in the tops than the preceding varieties. The leaves are green,

with very light green-coloured ribs, and strong green and long petioles.

The Silesian beet does not yield so large a percentage of sugar as the two preceding sorts, nevertheless it is much more extensively grown both in France and Germany than any other variety, because it yields a larger weight of roots per acre, is of a vigorous growth, and produces a larger amount of sugar per acre.

4. *Siberian Beet.*—A coarse pear-shaped root, with yellowish-white flesh; the top of the root is green-coloured, large, frequently hollow, and grows out of the ground. Leaves abundant and strong, light-green, with greenish, almost white-coloured ribs, and very strong, fleshy, greenish-white long petioles. It resembles the Silesian beet in appearance, is coarser, and yields a large weight of roots per acre, but a still smaller percentage of sugar than the Silesian beet.

5. *Imperial Beet.*—A delicate white pear-shaped root, with fine white flesh. The root grows almost entirely under ground. The top of the root growing above ground is small, and light-green. The leaves are light-green, erect, curled on the margin, indented with numerous light-green veins, and spring from short and strong petioles of the colours of the mid-rib and veins.

It does not yield so well as the Silesian beet, but is considered very rich in sugar.

By selection and careful cultivation several sub-varieties of Silesian beet have been raised, which are said to be superior to the original Silesian beet, which has broad luxuriant leaves, with erect light green-coloured petioles, and is apt to grow too much out of the ground.

The Silesian beet generally cultivated at the present time has more pendant leaves, and grows but little out of the ground, for which reason it is preferred to the original root.

As already stated, the white Silesian beet is the kind most approved on the Continent, for its sugar-producing qualities.

Good sugar-beets possess the following characters:—

1. They have a regular pear-shaped form, and smooth skin. Carrot-like long tapering roots are considered inferior to pear-shaped Silesian beets.

2. They do not throw out many fibrous-branched roots or forks.

Forked roots are difficult to clean, and not so readily pulped as well-grown symmetrical pear-shaped roots.

3. They have a white, firm, and dense flesh, and clean sugary taste. Such roots are readily reduced to a fine pulp by proper machinery. Soft and spongy thick-skinned roots are always more watery than beets of a uniformly firm, hard, and close texture.

4. Good sugar-beets generally weigh from $1\frac{1}{4}$ lb. to 2 lbs. Very small or very large roots are not usually well suited for the manufacture of sugar. Roots weighing under $\frac{3}{4}$ lb. are frequently woody, and besides sugar contain too large a proportion of other constituents, which prevent in a large measure the extraction of crystallized sugar from the juice, whilst roots weighing more than $2\frac{1}{2}$ lbs. are generally too watery and too poor in sugar.

5. Good sugar-beets always have small tops, and no tendency to become necky.

6. Such roots do not show much above ground, but grow almost entirely in the ground. Roots, the tops of which grow above ground, do not yield so much sugar as others that bury themselves better in the soil, for the heads of the roots, being exposed to light, turn greenish, and yield less crystallizable sugar than the parts covered by the soil. Manufacturers of sugar cut off the greenish-coloured heads of the roots before they are pulped, and hence much waste takes place when beet-roots grown in a large measure above ground are sent to the manufactory.

7. Generally speaking, the higher the specific gravity of a beet-root the more it is esteemed for its sugar-producing qualities. Good roots are considerably more dense than water, and rapidly sink to the bottom of a vessel filled with water.

8. The expressed juice of good beet-roots has a clean sweet taste, and a specific gravity of from 1·060 to 1·070. When very rich in sugar, the specific gravity of the juice rises above 1·070, reaching occasionally 1·075 to 1·078.

Selection of Seed.—Experience has shown that beet-roots rich in sugar produce seed from which roots, also rich in sugar, may be raised, whilst all seed from roots poor in sugar, as a rule, furnishes again inferior roots.

It is therefore of much importance to the beet-root grower to start with good seed. Great attention is paid on the Continent, especially in the north of Germany, to the growing of true and superior beet-root seed. Perhaps nowhere are beets richer in sugar grown than in the neighbourhood of Magdeburg, in Prussia; and, for this reason we would strongly advise English agriculturists purposing to cultivate sugar-beets to procure their seed from that locality.

Time of Sowing, and Distance of Planting.—The season for sowing beet-roots extends from the beginning of April to the first week in May. Generally speaking, it is undesirable to sow earlier than the first week in April, nor is it well to delay it longer, if possible, than the first week in May. Sown too early in spring, the roots are very apt to run to seed during growth,

especially if frosty nights should set in, and if delayed too long, the crop may not get fully ripe before it has to be taken up. On the whole, the middle of April is the best time for sowing beet-root.

Under ordinary circumstances the steeping of the seed in water can be dispensed with, but occasionally the steeping of the seed for 12 hours in water may be practised with advantage in advancing the growth of the plant.

As regards the quantity of seed used, it may be stated that in the north of Germany beet growers sow not less than 15 lbs. to the English acre, which is fully double the quantity of ordinary mangold-seed usually sown in England.

A much larger quantity of seed is required, because beet-roots have to be grown more closely than mangolds.

Of course the distances between the drills and between each plant have to be regulated according to the various agricultural conditions in which the land may be, upon which it is purposed to grow this crop. The better the soil the closer the roots may be grown. If grown too wide apart on good land, the beet-roots grow larger, but remain poor in sugar; and, on the other hand, planted too near each other, the roots get rich in sugar, but remain small, and the value of the produce in either case is less than when both extremes are avoided. Speaking generally, the distance between the rows and from plant to plant should not be less than 12 inches, nor greater than 18 inches.

After-culture.—The after-culture of the beet, like that of the mangold and root-crops generally, consists in timely and careful thinning, weeding, and keeping the soil in a loose and friable state, by means of the drill-harrow and the horse or hand hoe. As long as the young plants are not injured by hand-hoeing, the repeated application of the hoe from time to time will be attended with the greatest benefit to the crop, care being taken that the last hoeing is done so as to gather up the soil round each plant, in order that the head of the root may be completely covered.

Character of the Soils best adapted, or unsuitable, for the Growth of Beet-roots.—Like other green crops, the sugar-beet, though not equally well adapted for every kind of soil, is nevertheless grown on land varying greatly as regards depth, texture, and general physical and chemical properties. It may, however, be observed at once, that all soils incapable of being cultivated to a depth of at least 16 inches, are unsuited for the growth of sugar-beet, which, unlike the ordinary yellow globe-mangold, grows almost entirely under ground, and therefore cannot be cultivated with advantage on very shallow soils. Peaty soils are not suited for beets, nor stiff clay soils, and, more or less, all soils in a bad state of cultivation are unsuitable for its cultivation.

The chief requisites in soil upon which this crop is intended to be raised, are a sufficient depth and ready penetrability by the plant. A good friable deep turnip-loam, and all soils on which potatoes grow to perfection, are perhaps the most eligible of all for the growth of beet-roots. A moderate or even large amount of clay, far from being an undesirable element, is very useful for this crop, provided the land is well worked and the clay has become friable by exposure to the air, and by general good management.

It is sometimes stated that beet-root can only be grown to perfection on light, very porous, and naturally poor soils; but this is a great mistake, for on naturally poor sandy land sugar-beet cannot be grown economically. Such land requires to be previously well dunged in the autumn, and to be liberally treated with superphosphate at the time of sowing, before it will yield a paying crop of beets. On the other hand, there is no soil so well suited for beets as a good, well-worked, deeply cultivated, and thoroughly drained clay-loam; or, in other words, a soil containing a good deal of clay, with a fair proportion of sand. Most good clay-loams contain sufficient lime to meet the requirement of the beet-root crop. Many light soils, on the other hand, being poor in lime, are much improved by the application of clay, marl, chalk, or quicklime previous to ploughing up the land in autumn. On land deficient in lime the sugar-beet is apt to get fingered and toed, and hence care should be taken, before taking the land in hand for the cultivation of this crop, to ascertain whether it contains a fair proportion of lime.

The subsoil has an important influence on this, as on all root-crops. It should be sufficiently friable to allow the ready penetration of the roots, and be thoroughly well drained; for it is vain to hope to grow successfully good sugar-beets on land resting on a stiff, cold, and partially drained subsoil. In dealing with rather heavy land particular attention ought to be paid to autumn-cultivation. Deeply ploughing in autumn and stirring the subsoil without turning it up, and above all steam-cultivation, are some of the means of preparing such land for beet-roots. In short, the same rules which apply to the proper cultivation of the soil for other root crops should guide the farmer in preparing his land for sugar-beets.

Place of the Beet-root in the Rotation.—On the continent beet is always looked upon as a fallow crop. There are various modes of growing it in different countries, dependent on the soil, the climate, and the requirements of the markets, but in all cases it is considered good farming to let it both follow and precede a corn crop. Beet succeeds best after winter wheat, well-dunged. Clover or seeds, on the contrary, should not precede beets, for

although the roots grow to a large size and yield well after clover-seeds, they remain poor in sugar and take up too much saline matter from the decomposing vegetable remains of the preceding crop.

Beets are usually followed on the continent by spring wheat.

On land peculiarly well suited for roots, two or three crops of beet are sometimes taken in succession. In this case, however, it is necessary to apply farmyard manure, or artificials, to the second and third crops.

Manures for Beets.—Next to the soil, manure has a powerful influence on the quality of sugar-beets.

If possible, beets should not be grown in newly manured soils. In heavily and newly manured land the roots become poor in sugar and overcharged with saline matters. The presence of this excess of saline matters in the juice of beets is much dreaded by the manufacturer of beet-root sugar, inasmuch as they prevent largely the extraction of the sugar in a crystallizable state.

In beet-growing districts the manufacturers of sugar, therefore, protect their interest by stipulating in their contracts that the beets supplied by the grower have not been dunged.

If the soil, however, is very poor, it is impossible to grow anything like a crop without manure; in that case farmyard manure must be applied to the land in autumn, or 3 or 4 cwts. of guano, or a mixture of guano, bone-dust, and superphosphate and sulphate of potash. Peruvian guano has been used with advantage for beets on naturally poor soils, and when used in moderate quantities in autumn it greatly benefits this crop.

Sulphate of ammonia is also used on such land with considerable advantage for beets. Like guano it should be applied to the land in autumn, and sparingly.

Ammoniacal salts, guano, rotten dung, and in general all nitrogenous manures, require to be used with discrimination, for their tendency is to encourage the luxuriant growth of tops, and to diminish the percentage of sugar in the roots. A certain amount of available nitrogen in the soil appears to be necessary for the healthy growth of the sugar-beet, and hence the use of guano, or sulphate of ammonia, or animal manures cannot properly be condemned unconditionally, for, as just stated, these manures are beneficial to beets when the soil on which they are intended to be grown is either naturally very poor, or out of condition by repeated cropping. On the other hand, nitrogenous manures, such as guano, sulphate of ammonia, or rotten dung, should not be applied to beets when the land is in good heart. Soils in good agricultural condition always contain a sufficient amount of available nitrogen to meet the requirements of that root crop, and an extra supply of nitrogenous organic matter or ready formed

ammonia on such land does harm, inasmuch as it both diminishes the percentage of sugar in the beets, and prevents the manufacturer obtaining, in a crystallized form, as large an amount of sugar as he can produce from beets containing the same percentage of sugar, but grown without the use of nitrogenous manure.

Common salt, so largely applied to mangolds in this country, and nitrate of soda retard the ripening process, and in consequence act injuriously on sugar-beets. On the other hand, phosphatic manures favour early maturity. Superphosphate of lime may therefore be applied to the land with excellent effect at the time when the seed is drilled in. Bone-dust also does no harm, but good, to beets. On light soils, in which potash is generally deficient, a mixture of superphosphate and sulphate of potash having been found most serviceable to beets in many cases, can be thoroughly recommended, not only upon light sandy soils but upon all soils in a comparatively poor agricultural condition.

Maturity of Roots.—Beet-roots generally get ripe in about five months. When sown in the middle of April they will thus be ripe in an average season about the middle of September. However, much depends on the season and the character of the land in bringing the crop to maturity, and therefore the length of time during which the crop should be left in the ground cannot be expressed in general terms. The best time for taking it up is that when the roots are nearly ripe. This stage of development is recognised by most of the leaves turning yellow and flabby. As long as the tops are still quite green and succulent the roots will be found in a growing state, and as long as they continue to grow, sugar continues to be stored up in them. Should the weather be cold and no rain fall in autumn, the crop may be left in the soil without injury a week or fortnight after the roots are quite ripe. But should the autumn be mild and wet every chance is given to the roots to make a second growth, which should be avoided by all means, inasmuch as the young leaves in that case are produced in a great measure at the expense of stored up sugar in the roots. Nothing does so much injury to the beets as a second growth of tops after the roots have become ripe, and hence the safest plan is to take them up as soon as possible after the crop has arrived at maturity. Particular attention, therefore, should be paid by the beet-root grower to watch the ripening process, and he will find it useful, during the latter stages of growth, to test from time to time the roots for sugar. This may be done with sufficient accuracy for practical purposes, and with great ease, by grating a root or two, and squeezing out the juice by pressing the pulp through calico, and testing the specific gravity of the juice by means of a specific

gravity float. The juice of beets rich in sugar has a specific gravity not lower than 1·07, and as long as the gravity of the beet-root juice continues to increase sugar is still formed, and the roots should be left in the ground. A good indication of their maturity is afforded when a root is cut in two with a knife. If the newly cut surfaces of the beet rapidly turn colour on exposure to the air the ripening process is not completed, but if they remain unchanged, or turn only slightly reddish, it may be taken for granted that the beets are sufficiently ripe to be taken up. Immature roots sliced with a knife rapidly turn first red, then brownish, and finally quite dark, on the surface touched by the knife.

Great care is needed in harvesting the crop, for the slightest injury to the roots is sure to be followed by a proportionate loss of sugar. To the farmer who uses the root for his cattle this is of far less importance than to the manufacturer, whose main object is to extract as much sugar from the root as possible. When injured by careless manipulation in trimming or otherwise, fermentation is rapidly set up in the injured roots, the crystallizable sugar is converted into fruit-sugar or glucose, which does not crystallize, and is consequently lost. The crop should be taken up in fine dry weather, and especial precautions should be taken to preserve the roots, when stored, from wet and frost. It is desirable that they should be exposed on the ground for three or four days before they are stacked, in order that they may lose as much of their moisture as possible. The roots, however, should not be exposed for more than a few days to the air, and never to the sun. It is well, therefore, to cover temporarily the roots with their tops, in the field, before stacking.

Some farmers are in the habit of stacking the roots with their tops, but this is not a good plan, and it is far better to cut off the tops carefully without injuring the roots, and then to stack them. In storing beets especial care should be taken to prevent germination and throwing out fresh tops. As light, heat, and moisture greatly favour germination, which is always attended with loss of sugar, the roots should be especially guarded against these injurious influences.

The most effectual plan to preserve roots in good condition is to select a dry and suitable locality, to pile the roots in pyramidal stacks, about 6 feet broad at their base, and 7 feet high, and to cover the stacks immediately with dry earth. At first the roots should be covered but slightly with earth, in order that the moisture may readily evaporate, and subsequently, when frost sets in, another layer of earth, not exceeding one foot in thickness may be placed on the stacks.

If at once a thick layer of earth is placed upon the roots, the

moisture which they throw off cannot freely escape, and in consequence they are apt to heat and to suffer changes, which diminish the amount of crystallizable sugar which they contain.

Composition of Sugar-Beets.—If we take a beet-root and cut it across, we shall see that it is composed of concentric zones or layers, differing in colour, more or less, according to the variety.

The exterior, or skin, is composed of compact cellular tissue. Next will be seen concentric zones, the number of which corresponds with that of the several circles of leaves forming the tops, and the breadth of which depends on the stage of development of the leaves. The oldest and most external leaves are in direct communication with the oldest and most central layers or zones, composed of cellular and vascular tissue, whilst the youngest and most central leaves communicate with the most recent external concentric zones of the root, and provide them with nourishment.

If the leaves of a beet-root are very large and luxuriant, the concentric rings of the root with which they communicate will also be found very large, the tissue of their rings spongy, and the cells large and filled with sap that is, comparatively speaking, watery and poor in sugar.

On the other hand, the less luxuriant and smaller tops of well grown moderate sized beets will be found to correspond with concentric layers of cells of smaller dimensions, to be filled with a denser sap, richer in sugar than we find it in roots with large tops.

The best roots for the manufacture of sugar are those in which the size of these concentric layers of cells does not exceed $\frac{1}{8}$ to $\frac{1}{4}$ of an inch. As a rule such roots do not weigh more than 2 lbs. each ; their flesh is more firm and less transparent than that of big heavy roots, which exhibit on a cross section large concentric zones or layers of cells, filled with a liquid much poorer in sugar.

The walls of the cells are composed of cellulose, and upon this is deposited a gelatinous matter, called pectose, which occurs in all bulbous roots, and in fruits from which jelly can be obtained. Besides cellulose and pectose, constituting the bulk of the expressed pulp of beet-root, the latter contains small quantities of soluble albuminous compounds and insoluble mineral matters, chiefly composed of insoluble salts of lime. The liquid contents of the cells, or beet-root juice, contain in addition to sugar, their chief constituent, an appreciable amount of vegetable casein and analogous nitrogenous compounds, a little green colouring matter, oil, a peculiar acrid-tasting substance which has not as yet been satisfactorily isolated, citric, and probably other organic acids, and a number of saline compounds which constitute the soluble portion of the ash of beet-root.

Many of the constituents of beet-root are present only in very minute quantities, and their determination in exact quantities is of little or no practical utility.

In the following analytical investigation of a number of beet-roots grown in England under a variety of conditions, to which attention will be directed presently, I have therefore not considered it necessary to determine quantitatively all the various constituents of sugar-beets, but have confined myself to ascertain with accuracy the amount of—

1. Water.
2. Crystallizable sugar.
3. Pectinous substances.
4. Albuminous or nitrogenous compounds.
5. Crude vegetable fibre (exhausted pulp).
6. Mineral matter (ash).

With regard to the method employed for determining the preceding constituents, the reader is referred to a paper of mine 'On the Composition of Orange Globe Mangolds' (*vide* 'Journal of the Royal Agricultural Society,' vol. i., 2nd series, part ii., 1866), in which he will find fully described the various steps in conducting the analysis of roots. The same plan there described has been adopted in the present instance with one exception. Instead of determining the amount of sugar by the fermentation process, as in the case of the mangold analysis, a standard copper solution was employed for determining the amount of sugar in all the beet analyses. The process known as the copper-test for sugar need not be described here in detail, as it may be found, with all the requisite precautions necessary to be observed to secure accurate results, in any text-book treating of quantitative analysis.

In each case two separate water-determinations were made, and in most cases the sugar was also determined in two or more separate portions of the beet-juice, the specific gravity of which was likewise ascertained in most instances.

The roots submitted by me to analysis were supplied by Mr. James Duncan, of Mincing Lane, a gentleman who, as many of the readers of the leading daily journals and the agricultural papers may remember, has lately erected, at a cost exceeding 6000*l.*, works and machinery for the extraction of the sugar from beet-roots, within a few yards of the railway station at Lavenham, in Suffolk.

Mr. Duncan last season received about 800 tons of the sugar-beet from a body of intelligent Suffolk farmers residing in the neighbourhood of Lavenham, amongst whom he distributed the seed of two varieties of Silesian beet, the kind most approved on the Continent for its sugar-producing qualities.

The land in the neighbourhood of Lavenham, upon which the beets were grown in 1868, was for the greater part rather too stiff and retentive, not over fertile, and altogether not particularly favourable to beet-root culture. In several instances the land was in too poor an agricultural condition to promise a fair crop, and use was made of Peruvian guano in raising the beet crop. Mr. Duncan has entered this season into an engagement with a number of Suffolk farmers to pay them at the rate of 20*s.* per ton for well cleaned trimmed beets, and with a favourable season expects to receive 4000 tons. His works, when fully employed, are capable of using up 60 tons a day. At this rate he will be able to complete the extraction of the sugar from 6000 tons in 100 days.

Besides the experiment at Lavenham, Mr. Duncan last spring (1868) distributed seed in various parts of England and Scotland with a view of testing by analysis the sugar-yielding qualities of different districts, and, by way of comparison, obtained some Dutch beet-roots, which he sent me for analysis.

Much credit is due to Mr. Duncan for the spirited manner in which he is now carrying out an experiment on a large scale, which, it is to be hoped, will benefit alike the beet-root grower and the manufacturer of sugar; and which moreover recommends itself by providing rural districts with a new agricultural industry that will afford employment, if successful, to a large body of people during three months of the slackest period of the year.

In reporting on the numerous beet-root analyses which I made of roots grown in 1868, I will, in the first place, refer to the composition of the roots grown in the neighbourhood of Lavenham (see Table I., following page), and afterwards on that of beets grown in other districts, and on roots under special conditions.

The weight of the roots, to which the following analyses refer, varied, it will be seen, from $1\frac{1}{2}$ to $2\frac{3}{4}$ lbs. Several of the heavier roots yielded a higher percentage of sugar than No. 2 beet, which weighed only $1\frac{1}{2}$ lb., and contained $9\frac{1}{3}$ per cent of sugar, that is, a smaller percentage than any of the other 7 roots. It is quite true that big roots generally are more watery and less rich in sugar than beets of a moderate size, but, at the same time, it does not hold good that small roots invariably contain more sugar than large beets. In the course of my investigation I found frequently beets weighing above 2 lbs. and not exceeding 3 lbs. richer in sugar than roots weighing only 1 lb. and under. As far as my present experience with respect to sugar-beets grown in England goes, I am inclined to think that, as a rule, it is neither profitable for the farmer to grow beets of less weight than 2 lbs., nor to the manufacturer to work up any small roots.

TABLE I.

COMPOSITION OF SUGAR-BEETS (SILESIAN) GROWN IN THE NEIGHBOURHOOD OF LAVENHAM, SUFFOLK.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Description of root	Green top, white skin.	Red top, rose-coloured skin.	White pear-shaped root.	Long red root.	Long red root.	Pear-shaped white root.	Small red top.	Pear-shaped white root.
Weight of root	$2\frac{3}{4}$ lbs.	2 lbs. $4\frac{1}{2}$ ozs.	$1\frac{1}{2}$ lbs.	2 lbs.	$1\frac{3}{4}$ lb.	2 lbs. 5 ozs.	1 lb. $4\frac{3}{4}$ ozs.	2 lbs. $12\frac{1}{4}$ ozs.
Specific gravity of juice ..	1·0637	1·0689	1·058	1·0612	1·0628	1·0589	1·0659	1·0643
At a temperature of	64° F.	64° F.	62° F.	62° F.	..	..	58° F.	58° F.
Moisture	83·11	82·72	83·03	83·43	82·70	82·27	81·76	83·34
* Albuminous compounds ..	1·25	1·44	1·71	1·53	1·23	1·08	2·13	2·12
Crude fibre (pulp)	3·43	3·38	4·31	3·49	3·60	3·73	3·77	3·04
Crystallizable sugar	10·51	10·94	9·31	10·04	10·72	11·14	10·55	9·74
Pectin, colouring matter, &c.	·63	·45	·60	·50	·68	·74	·70	·52
Mineral matter (ash) ..	1·07	1·07	1·04	1·01	1·07	1·04	1·09	1·24
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·200	·231	·275	·245	·197	·173	·341	·340

The preceding roots were all received for analysis on the 23rd Oct., 1868. Nos. 1 and 2 were grown by Mr. Hitchcock, Lavenham. Nos. 3 and 4 by Mr. C. Northcott, Thorpe. Nos. 5 and 6 by Mr. Mumford, Thorpe. Nos. 7 and 8 by Mr. W. Baker, Metford.

I have placed the preceding analyses together because the variations in the composition of the several beets are but inconsiderable, and these analyses may be taken as fairly representing the composition of English sugar-beets of good sugar-producing qualities.

In the next Table the composition of similar roots is given, in conjunction with that of beets containing a high percentage of sugar (See Table II., following page).

The beets Nos. 10, 11, and 12, it will be noticed, yielded on an average a little over 12½ per cent. of crystallizable sugar, and the remaining ones, with the exception of No. 9, rather more than 11 per cent.

As might have been expected, the roots with a high percentage of sugar contained less water than those poor in sugar. The relations between the percentage of water and sugar, however, are not exactly the same in the different roots, and the amount of water in a beet-root cannot therefore be regarded as indicating exactly the percentage of sugar which it contains.

Thus, if we compare No. 13 with No. 15, we find that the former, which contained a little more water than the latter, nevertheless yielded about ½ per cent. more crystallizable sugar, whilst No. 9, containing the same percentage of water as No. 13, in round numbers yielded 2 per cent. less sugar than the latter.

It is, therefore, true only in a general way that the percentage of water affords an indication of the sugar-producing qualities of roots.

A glance at the preceding analyses will show that the specific gravity of the expressed beet-root juice may be regarded as a good general indication of the sugar-producing qualities of beet-roots.

The roots marked No. 10 and No. 12 are very rich in sugar, and the specific gravity of their juice, as will be seen, is also higher than that of the juice of the other beets. Whenever the specific gravity of the juice of beet rises above 1·07, the roots may be considered very superior, and to yield a high per-centage of sugar; whilst a low specific gravity of the juice invariably characterizes roots of low sugar-yielding qualities. In the next Table (III.) I have placed side by side the composition of some sugar-beets of a lower specific gravity than fair average sugar-producing qualities.

In every instance the beets with a low percentage of sugar yielded a juice of low specific gravity. Thus, the juice of beet, No. 19, yielding 6 per cent. of sugar in round numbers, had a specific gravity of 1·0469, and that of No. 22, containing only 5 per cent. of sugar, a gravity of only 1·0457.

On throwing a glance at Table III., it will also be observed that the juice of comparatively small beets has not invariably a higher specific gravity than that of larger roots. Within certain limits

TABLE II.

COMPOSITION OF SILESIAN SUGAR-BEETS GROWN IN THE NEIGHBOURHOOD OF LAVENHAM, SUFFOLK.

	No. 9.	No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.
Description of root	Red-skinned small root.	Small white root.	White, pear-shaped roots.	Red top, pear-shaped roots.	Red top.	Green top.	Green top, white root.	Red top, reddish skin.
Weight of root	1 lb. 6½ ozs.	1 lb. 4 ozs.	1 lb. 7½ ozs.	2 lbs. 6 ozs.	2 lbs. 13½ ozs.	2 lbs. 12¼ ozs.	2 lbs. 8 ozs.	2 lbs. 8 ozs.
Specific gravity of juice ..	1·0612	1·0734	1·0669	1·0718	1·065	1·060	1·0698	1·0636
At a temperature of	64° F.	64° F.	64° F.	63° F.	68° F.	62° F.	62° F.	64° F.
Moisture	82·65	78·97	80·41	79·18	81·61	82·41	81·32	82·01
* Albuminous compounds ..	1·60	1·97	1·46	1·66	1·06	1·41	1·36	1·93
Crude fibre (pulp)	4·11	4·69	3·99	4·56	3·86	3·31	4·51	3·12
Sugar (crystallizable) ..	9·62	12·65	12·49	12·84	11·72	11·21	11·33	11·14
Pectin, &c.	·84	·62	·73	·80	·63	·68	·65	·82
Mineral matter (ash) ..	1·18	1·10	·92	·96	1·12	·98	1·03	·98
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·257	·316	·233	·266	·163	·227	·218	·310

Nos. 9 and 10 were given by Mr. Mumford, Lavenham Hill. Nos. 11 and 12 by Mr. John Wright, Preston. Nos. 13 and 14 by Mr. Hawkins, Melden. Nos. 15 and 16 by Mr. H. Talbot, Stanmore Field.

TABLE III.

COMPOSITION OF SILESIAN SUGAR-BEETS, GROWN IN THE NEIGHBOURHOOD OF LAVENHAM, SUFFOLK.

	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.	No. 23.	No. 24.
Description of root	Green top.	Red top.	White, green top.	Red top, reddish skin.	Green top, white root.	Red top, reddish skin.	Red top.	Green top.
Weight of root	2 lbs. 10½ ozs.	2 lbs. 1 oz.	13 ozs.	11½ ozs.	5 lbs. 6 ozs.	2 lbs. 8 ozs.	2 lbs. 1 oz.	2 lbs. 5 ozs.
Specific gravity of juice ..	1·0587	1·0597	1·0469	1·0707	1·0562	1·0457	1·0575	1·0634
At a temperature of	64° F.	64° F.	62° F.	60° F.	..	..	..	..
Moisture	83·25	82·59	84·86	80·67	85·27	87·75	85·48	83·00
*Albuminous compounds ..	2·66	2·26	2·12	2·55	1·75	2·37	2·01	2·23
Crude fibre (pulp)	3·90	4·15	4·48	5·28	2·99	2·85	3·59	3·18
Sugar (crystallizable) ..	8·20	9·10	6·11	9·26	8·04	5·08	7·03	9·42
Pectin, &c.	·60	·71	·74	·97	·74	·42	·54	·82
Mineral matter (ash) ..	1·39	1·19	1·69	1·27	1·21	1·53	1·35	1·35
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·426	·362	·340	·409	·281	·380	·321	·357

Nos. 17 and 18 grown by Mr. T. Baker, Lavenham. Nos. 19 and 20 grown at Preston. Nos. 21 and 22 grown by Mr. Jennings, Muckford.

this is generally the case, but not unfrequently we meet with exceptions to this general rule; and it sometimes happens that the juice of very small roots has an unusually low specific gravity, whilst beets weighing considerably more than 3 lbs., when well ripened, not unfrequently produce a juice containing a much larger percentage of sugar and having a higher specific gravity than very small immature roots.

In the preceding Table, No. 19 was the smallest root, and weighed only 13 ounces. Nevertheless its juice had only a gravity of 1·0469. Again, No. 21 and No. 22, which were both grown on the same farm, differed greatly in weight, No. 21, weighing 5 lbs. 6 oz. or more than twice the weight of No. 22. Notwithstanding its greater and, for a beet, unusually heavy weight, the juice of No. 21 was higher in specific gravity and yielded more sugar than that of the smaller beet, No. 22.

The percentages of water in the preceding tabular statement vary greatly, the lowest in round numbers being $80\frac{1}{2}$ and the highest $87\frac{3}{4}$ per cent.

The heaviest beet of the 8 (No. 21), weighing nearly $5\frac{1}{2}$ lbs., was not the most watery, for it contained $2\frac{1}{2}$ per cent. less water than No. 22, weighing only $2\frac{1}{2}$ lbs. Indeed No. 21 contained scarcely $\frac{1}{2}$ per cent. more water than the very small root, No. 19, weighing only 13 ounces and yielding 2 per cent. less sugar than the big beet. These results are of practical importance, for they show that it is quite possible to grow large sugar-beets of good average sugar-producing qualities. The aim of the beet-root-grower should be to obtain from his land a heavy crop, and at the same time roots of good average sugar-producing quality.

On some land in England, I believe, from 20 to 25 tons of sugar-beets, of a quality not objected to by the manufacturer of beet-root sugar, might, and probably will, be produced at no very distant period, when more attention than at present will be paid to the proper selection of the seed, to the mechanical cultivation of the soil, and especially to the supply of the right kinds and proper quantities of manuring matters most favourable for beets on particular soils.

The amount of water in the preceding roots varies from 81 to $86\frac{3}{4}$ per cent., and that of sugar from 7 to $11\frac{1}{2}$ per cent.

Attention may be directed to the great similarity of the composition of roots No. 25 and No. 26, both grown on the same farm. Although white beets weighed $1\frac{1}{4}$ lb. more than the red-skinned root they yielded quite as much sugar as the latter, and, taking no account of minute differences, contained not more albuminous matters, water, and saline mineral constituents. Probably white Silesian beets are better suited for the land on which both kinds were grown than the red skinned and purple-top sugar-beet.

TABLE IV.

COMPOSITION OF SILESIAN BEETS GROWN IN THE NEIGHBOURHOOD OF LAVENHAM.

	No. 25.	No. 26.	No. 27.	No. 28.	No. 29.	No. 30.	No. 31.	No. 32.
Description of root	White skin.	Red skin.	Red skin.	Green top, white root.	Green top.	Red top.	Red.	White.
Weight of root	2 lbs. 14 ozs.	1 lb. 10 ozs.	1 lb. 1 oz.	1 lb. 13½ ozs.	1 lb. 12¼ ozs.	1 lb. 7¼ ozs.	..	..
Specific gravity of juice ..	1·058	1·0551	1·0611	1·0679	1·0695	1·0648	..	..
At a temperature of	58° F.	60° F.	63° F.	63° F.	60° F.	62° F.	..	..
Moisture	84·73	84·53	82·76	81·42	81·06	81·76	85·37	86·82
*Albuminous compounds ..	1·91	2·06	1·37	1·68	1·76	1·27	·97	1·10
Crude fibre (pulp)	3·20	3·59	4·01	4·34	3·83	4·09	2.93	3·17
Sugar (crystallizable) ..	8·39	7·78	9·97	10·59	11·49	11·12	9·19	7·04
Pectin, &c.	·52	·70	·72	·69	·82	·74	·45	·50
Mineral matter (ash) ..	1·25	1·34	1·17	1·28	1·04	1·02	1·09	1·37
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·307	·331	·220	·269	·282	·204	·156	·176

Nos. 25 and 26 grown by Mr. Coe, of Kirtlington. Nos. 27 and 28 grown by Mr. Leich, Great Waldingfield.
Nos. 31 and 32 grown at Lavenham.

TABLE V.

COMPOSITION OF SILESIAN SUGAR-BEETS GROWN IN THE NEIGHBOURHOOD OF LAVENHAM.

	No. 33.	No. 34.	No. 35.	No. 36.	No. 37.	No. 38.	No. 39.	No. 40.
Description of root	Green top, white skin.	Red top, red skin.	White, pear-shaped root.	Small fusi-form, red-skinned root.	Red-skinned, pear-shaped root.	Large white.	Small white.	Red skin.
Weight of root	2 lbs. 13 ozs.	2 lbs. 1 oz.	1 lb. 10½ ozs.	12 ozs.	2 lbs. 2 ozs.	2 lbs. 8 ozs.	1 lb.	2 lbs. 11 ozs.
Specific gravity of juice ..	1·0675	1·0587	1·052	1·055	1·060	1·0674	1·0683	1·0468
At a temperature of ..	..	..	65° F.	68° F.	68° F.	..	..	..
Moisture	82·76	87·66	82·24	84·79	82·94	81·87	81·15	86·39
*Albuminous compounds ..	1·66	1·43	1·81	2·05	1·61	1·56	1·86	2·13
Crude fibre (pulp)	3·08	2·69	3·35	4·13	3·38	3·02	3·90	3·79
Sugar (crystallizable) ..	10·91	6·48	11·13	6·82	10·17	11·99	11·58	5·52
Pectin, &c.	·52	·62	·58	·71	·65	·58	·52	·75
Mineral matter (ash) ..	1·07	1·12	·89	1·50	1·25	·98	·99	1·42
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·266	·230	·290	·329	·259	·250	·298	·374

Nos. 33 and 34 grown by Mr. Hustler, East Hill. Nos. 35, 36, and 37, grown by Mr. Makins, Preston.
Nos. 38, 39, and 40, grown by Mr. William Biddell.

TABLE VI.

COMPOSITION OF SILESIAN SUGAR-BEETS GROWN IN THE NEIGHBOURHOOD OF LAVENHAM.

	No. 41.	No. 42.	No. 43.
Description of root	White skin.	Red skin.	Orange skin.
Weight of root	2 lbs. 12 ozs.	1 lb. 9 ozs.	1 lb. 12½ ozs.
Specific gravity of juice ..	1·0487	1·0542	1·0601
At a temperature of	62° F.	62° F.	62° F.
Moisture	84·67	85·07	81·86
*Albuminous compounds ..	1·95	2·41	2·37
Crude fibre (pulp)	3·99	4·11	4·79
Crystallizable sugar	7·27	6·32	8·78
Pectin, &c.	·83	·56	·76
Mineral matter (ash)	1·29	1·53	1·44
	100·00	100·00	100·00
* Containing nitrogen	·312	·386	·380

Nos. 41, 42 and 43 grown by Mr. Gayford, Preston.

In the preceding tables I have placed side by side the composition of some of the best and some of the worst roots which were grown in 1868 in the neighbourhood of Lavenham. It will be seen that No. 33, weighing nearly 3 lbs., and being the heaviest of the 11 roots, yielded a high percentage of sugar, and No. 38, weighing 2½ lbs., a still higher percentage, namely 12 per cent.

Comparing No. 38 with No. 39, and taking no account of minute differences, it will be noticed that the larger of the 2 white Silesian beets, both grown on the same farm, was rather the better of the two beets.

On the other hand Mr. Biddell's red-skinned Silesian beet, weighing only 3 ounces more than the white (No. 38), contained about 4½ per cent. more water, and only just half the amount of sugar found in the white.

The difference in the composition of the white and red skinned Silesian beets, grown by Mr. Hustler, East Hill, is very striking. The white beet (No. 33), though heavier than the red skinned (No. 34), in round numbers contained 5 per cent. less water and 4½ per cent. more sugar than the latter.

Of the 11 roots, 1 had an orange coloured skin, 5 were red-skinned and purple-top roots, and 5 white and green-top beets.

All the 5 red-skinned roots were inferior in quality in comparison with the white beets grown on the same farms on which the red were grown.

The 5 red Silesian beets were much more watery, and poorer

in sugar, than the 5 white roots which in all probability arrived earlier at maturity, and on that account may be more suitable for our English climate than the red skinned and purple topped Silesian sugar-beet.

The analyses of the 43 beet-roots, all grown in the neighbourhood of Lavenham, Suffolk, are well calculated to illustrate the great variations which, may and do, occur in the sugar-producing qualities of beets, although grown in the same season and the same locality. At the same time the analyses of most of the Lavenham sugar-beets clearly show that the Silesian beets grown in 1868 in that neighbourhood, though not equal in sugar-yielding quality to the sugar-beets raised in the celebrated beet-root districts near Magdeburg and other parts of Northern Germany, compare favourably with French, Belgian, and Dutch beets, which on an average seldom contain more than from $8\frac{1}{2}$ to 9 per cent. of crystallizable sugar.

Last season (1868) Mr. Duncan procured some Silesian sugar-beets from Holland, and forwarded them to me for examination. The two varieties of the Dutch roots on analysis yielded the following results:—

TABLE VII.—*Composition of Silesian Beet-roots grown in Holland.*

Kind of root	Purple-skinned root.	....	Pink-coloured root.
Weight of root	2 lbs. $10\frac{3}{4}$ ozs.	....	1 lb. $13\frac{1}{4}$ ozs.
Specific gravity of juice ..	1·0655	....	1·0542
At a temperature of ..	60° F.	....	60° F.
Moisture	82·79	....	85·67
*Albuminous compounds ..	1·12	....	1·91
Crude fibre (pulp)	4·07	....	3·40
Crystallizable sugar ..	10·56	....	7·42
Pectin, &c.	·45	....	·33
Mineral matter (ash) ..	1·01	....	1·27
	100·00		100·00
*Containing nitrogen ..	·18		·306

The first variety of the Dutch beet-root, it will be noticed, is much superior to the second, but not quite equal in sugar-yielding qualities to the beet-roots grown in the same season in the neighbourhood of Lavenham in Suffolk.

In the next place I beg to direct attention to two varieties of Silesian sugar-beets which were raised in 1868 at Lodge Farm, Barking Creek, entirely upon sewage. The red-skinned beet weighed 2 lbs. $2\frac{1}{4}$ oz., and the white 4 lbs. 1 oz. The former was very firm and of a delicate texture, the latter rather spongy and decayed in the centre.

The two roots yielded on analysis the following results :—

TABLE VIII.—*Composition of Silesian Sugar-beets manured with London Sewage, Lodge Farm, Barking Creek.*

Kind of root	Red.	....	White.
Weight of root	2 to 2¼ ozs.	....	4 to 1 oz.
Specific gravity of juice	1·0716	....	1·0458
At a temperature of	64° F.	....	58° F.
Moisture	80·79	....	87·94
*Albuminous compounds	·88	....	1·26
Crude fibre (pulp)	3·32	....	3·08
Crystallizable sugar	13·19	....	6·05
Pectin, colouring matter, &c. ..	·91	....	·48
Mineral matter (ash)	·91	....	1·19
	100·00		100·00
*Containing nitrogen	·124		·202

It is a remarkable fact that of all the specimens analysed last season, that grown on the London sewage at Barking proved the highest in sugar-producing quality. Fearing a mistake might have been made I repeated the analysis with closely agreeing results. There can, therefore, be no reasonable doubt that the red-skinned Silesian beet grown on London sewage really contained 13 per cent. of sugar.

It is further well deserving special notice that, notwithstanding the large amount of sugar, and the fact that the beet was grown on sewage, it contained but a very small amount of albuminous or nitrogenous compounds, and less saline mineral matter than almost any other specimen analysed by me in 1868. This is of great importance to the manufacturer of sugar, who knows full well that the albuminous compounds and the saline matters in beet-root juice destroy, in the process of manufacture, the crystallizing property of a certain amount of sugar. Of two roots containing an equal percentage of crystallizable sugar, but variable proportions of albuminous and saline matters, the one containing the smaller amount of soluble compounds, other than sugar, will therefore produce the larger proportion of soluble crystallized sugar.

The larger white Silesian beet from the same farm, it will be noticed, contained 88 per cent. of water, or about as much as ordinary mangolds grown for feeding purposes in this country, and yielded not quite half the amount of sugar which I found in the red-skinned beet.

As stated already the large white root was rotten in the centre, of a porous texture, and had more transparent flesh than the red and much smaller specimen.

I have not been able to ascertain whether both varieties were sown at the same time, and whether each were dressed with the same amount of London sewage. Judging by the physical character of the white Barking beet, and its chemical composition, I am inclined to think that it probably received an excess of sewage and by it was forced on too rapidly. If this be so we learn from the remarkably good qualities of one of the sewage grown beets, and the watery poor condition of the other, the lesson of applying sewage to beets and mangolds with discrimination. Used at the right time, and in proper quantities, town sewage may become one of the most useful fertilizers for sugar-beets; on the contrary, when applied in excess or at a period of the year when the further supply of plant food ought to be withheld as much as possible, sewage is likely to do serious mischief to that crop.

As yet our experience with regard to the most profitable mode of applying sewage to the land is very limited, and it would, therefore, be rash to give special directions as to the quantities of sewage which should be applied to sugar-beets, or to point out how often and when this fertilising liquid should be used. It may be stated, however, in a general way, that town sewage may be employed with great advantage in repeated doses during the first 2 or 3 months of the growth of the root-crop. It will then encourage an early luxuriant and healthy development of leaves, by which sugar is afterwards elaborated from atmospheric food and stored up in the roots. The more completely the supply of soil-food is withheld during the late summer months, the more fully will the beet-crop ripen, and the richer it will become in sugar in consequence. Sewage, therefore, should not be applied to sugar-beet during the last 2 or 3 months of its growth.

Many persons with whom I have conversed on the subject of sugar-beet culture have entertained doubts whether our English summers are warm enough to ripen sugar-beets sufficiently, because they have an idea that this crop requires a great amount of heat for coming to perfection. Whether or not England is a country favourable to sugar-beet culture experience alone can decide, but if beet-root culture should ultimately prove to be a failure in England, it will not be on account of the want of summer heat. In point of fact sugar-beets do not nearly so well in Central France or Germany, nor in the South, as in the North where the summer temperature is much lower. It is not so much heat as a dry and unclouded sky during the autumnal months which makes the sugar in the beet. It is further of much consequence whether the end of April and the month of May are wet or dry. The more rain falls on the land—

during the first two months of its growth—the better the crop is likely to turn out if a dry autumn follows.

A bright and dry August seems to do more for sugar-beets than almost any other condition, however favourable it may be to the healthy development of this crop.

Sugar-beet culture therefore is not likely to succeed well in a great part of Ireland, nor in the south and south-western counties of England, nor in localities in which the late summer and autumnal months of the year are as a rule warm and wet. On the other hand, the eastern and northern counties, and even many districts in Scotland, as regards climate, unless I am greatly mistaken, appear to me decidedly favourable for the cultivation of sugar-beets. By way of experiment, Mr. Duncan had some Silesian sugar-beets grown in several places in Scotland, and the result of this experiment proved to be a great success as far as the quality of roots was concerned.

The next tabular statement embodies the analytical results which I obtained in ascertaining the composition of these beets (See Table IX., following page.)

These analyses present several points of interest.

Looking at the three roots grown by Mr. Kennedy, in Ayrshire, it will be noticed that the smallest root of the three, weighing little more than 1 lb., contained much more water and was much poorer in sugar than the two other roots, each of which weighed over 3 lbs. The root marked No. 2 is indeed an excellent sugar-beet, for it is not only rich in crystallizable sugar, containing 12 per cent., but it likewise contains very small quantities of saline matter and nitrogenous compounds, which destroy the crystallizing power of sugar in the manufacturing processes.

With the exception of No. 1, all the beets grown in Scotland in 1868 were of a good size; some weighed nearly 3 lbs., and most 3 lbs. and more.

Even these beets, which contained rather a high percentage of water, yielded in round numbers not less than 8½ per cent. of crystallizable sugar which may be taken as a very good average percentage.

Altogether the beets grown in Scotland showed as high an average percentage as those raised in England, a smaller amount of nitrogenous and undesirable saline matter, and, on the whole, were more valuable to the manufacturer of beet-root sugar than the majority of the English roots.

The roots grown in Norfolk, in Berkshire, and Buckinghamshire possess fair average sugar producing qualities; but those grown in Devonshire are very watery, and scarcely so useful for general purposes as ordinary well-ripened mangolds (See Table X.).

TABLE IX.

COMPOSITION OF SILESIAN SUGAR-BEETS GROWN IN SCOTLAND IN 1868.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
Description of root ..	Red.	White.	Rose.	Green skin.	White skin.	Long red root.	Red.	White.	Rose.
Weight of root	1 lb. 1¼ ozs.	3 lbs. 1½ ozs.	3 lbs. 4½ ozs.	3 lbs. 2 ozs.	3 lbs. 4½ ozs.	3 lbs.	2 lbs. 14½ ozs.	2 lbs. 13½ ozs.	2 lbs. 10½ ozs.
Specific gravity of juice	1·0577	1·0671	1·060	1·0567	1·0534	1·0575	1·0532	1·0649	1·0607
At a temperature of ..	67° F.	65° F.	59° F.	60° F.	60° F.	63° F.	63° F.	64° F.	64° F.
Moisture	85·21	81·56	83·36	84·38	86·02	85·06	86·18	82·17	83·96
*Albuminous compounds	·93	1·50	1·41	1·24	1·40	1·23	·84	1·47	1·27
Crude fibre (pulp) ..	3·53	3·28	2·88	3·05	2·65	3·08	2·73	3·26	3·12
Sugar (crystallizable)	8·65	12·18	10·46	9.50	8.43	8·96	8·45	11·24	9·69
Pectin, &c.	·44	·57	·83	·76	·31	·43	·44	·84	·75
Mineral matter (ash) ..	1·24	·91	1·06	1·07	1·19	1·19	1·36	1·02	1·21
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen ..	·213	·240	·227	·199	·225	·205	·135	·236	·204

Nos. 1, 2, and 3, grown by the Right. Hon. F. T. Kennedy, Dalquharran Castle, Maybole, Ayrshire. Nos. 4, 5, and 6, grown by Mr. Taylor, N. B. Nos. 7, 8, and 9, grown by Mr. Hannah, N. B.

TABLE X.

COMPOSITION OF SILESIAN SUGAR BEETS GROWN IN NORFOLK, BERKSHIRE, BUCKINGHAMSHIRE, AND DEVONSHIRE.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Kind of root	Small white.	Large white.	Red.	White.	Red.	White.	Red.	White.
Weight of root	1 lb.	2 lbs.	1 lb. 13 ozs.	2lbs. 4 ozs.	2 lbs. 9 ozs.	2 lbs. 14¾ ozs.	2 lbs. 2 ozs.	2 lbs. 2 ozs.
Specific gravity of juice ..	1·059	1·0558	1·0558	1·0465	1·0659	1·0588	1·036	1·0309
At a temperature of	60° F.	60° F.	64° F.	64° F.	62° F.	62° F.	68° F.	68° F.
Moisture	84·32	85·22	85·23	86·71	82·35	83·93	89·44	90·36
* Albuminous compounds ..	1·28	1·51	1·70	2·13	1·55	1·76	1·26	1·58
Crude fibre (pulp)	3·51	4·11	2·92	3·13	3·25	3·21	2·21	2·75
Crystallizable sugar	9·42	7·46	8·86	6·67	11·09	9·31	5·46	3·62
Pectin, &c.	·48	·55	·47	·50	·52	·63	·48	·46
Mineral matter (ash) ..	·99	1·15	·82	·86	1·24	1·16	1·15	1·23
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·206	·213	·273	·341	·218	·283	·203	·253

Nos. 1 and 2 grown by the Rev. W. B. Hunnard, Ringham Rectory, Norfolk. Nos. 3 and 4 grown by Mr. James Kimber, Tubney Warren, Abingdon, Berkshire. Nos. 5 and 6 grown at Woolston. Nos. 7 and 8 grown in Devonshire.

It is to be regretted that I had merely the opportunity of examining sugar-beets grown in only one locality of Devonshire.

The red-skinned beet, it will be seen, contained 89½ per cent. of water, and yielded 5½ per cent. of sugar; while the white Silesian beet from the same place was still more watery than the red, and produced only 3½ per cent. of sugar.

Equally poor in sugar to the Devonshire roots I found some sugar-beets which the late Mr. P. H. Frere raised in 1865 from four varieties of French sugar-beet seeds on his farm in the neighbourhood of Cambridge.

These roots on analysis were found to have the composition given in Table XI.

TABLE XI.

Composition of Four Varieties of Sugar-beets grown from French Seed, by the late Mr. P. H. Frere, near Cambridge, in 1865.

	No. 1.	No. 2.	No. 3.	No. 4.
Variety	Toupé Blanche choisie.	Blanche commune.	Rose ordinaire.	Toupé Rose choisie.
Water	89·34	89·42	90·63	90·47
Crystallizable sugar ..	5·22	5·90	3·94	3·54
*Soluble albuminous compounds	1·75	1·19	1·63	1·76
† Insoluble albuminous compounds	·31	·31	·12	·25
Crude fibre	1·72	1·70	1·60	1·77
Pectin, &c.	·21	·08	·80	·78
Soluble mineral matter ..	1·38	1·33	1·13	1·28
Insoluble mineral matters	·07	·07	·15	·15
	100·00	100·00	100·00	100·00
* Containing nitrogen	·28	·19	·26	·28
† Containing nitrogen	·05	·05	·02	·04

In raising these roots no particular attention was paid to the condition of the land. They were grown like ordinary mangolds, with plenty of fresh dung, and no doubt owing to this cause they were not better than common mangolds, and were unsuitable for the manufacture of sugar.

It will be noticed that nearly the whole amount of the albumen and similar nitrogenous compounds existed in these roots in a form soluble in water, and that the mineral matter or ash likewise consisted of salts which are soluble in water.

Not only in these, but in all sugar-beets and mangolds which I have examined, the albuminous compounds and mineral matters occur almost altogether in a soluble state, and conse-

quently pass into the juice when the rasped roots are placed in the presses of the sugar-manufacturer.

The injurious effects of a heavy dose of dung applied to sugar-beets in spring is shown still more strikingly than in the preceding analysis in the subjoined Table, in which the composition is given of two unusually large roots, both raised from true white Silesian beet-seed.

TABLE XII.—*Composition of Two very large White Silesian Beets analysed on the 8th December*, 1868.

Weight of root	11 lbs. 6 ozs.	$6\frac{1}{2}$ lbs.
Specific gravity of juice	1·0431	1·0553
At a temperature of	65° F.	65° F.
Moisture	92·58	88·13
*Albuminous compounds	1·40	2·16
Crude fibre (pulp)	1·73	2·74
Crystallizable sugar	2·22	4·82
Pectin, &c.	·47	·44
Mineral matter (ash)	1·60	1·71
	100·00	100·00
*Containing nitrogen	·225	·347

The larger of the two beets contained only $7\frac{1}{2}$ per cent. of solid matter, of which little more than 2 per cent. was sugar. Considering the large amount of water in this root, the percentage of both albuminous compounds and saline mineral matter is very high.

The smaller of the two beets was not so watery as the larger one, and was richer in sugar. It was, however, a poor root even for feeding purposes, and, like all roots of low feeding quality, comparatively rich in albuminous matters and ash constituents.

With a view of studying the influence of different soils and of manure on the quality of sugar-beets, Mr. Duncan made some experiments last year, which are not without interest.

One lot was grown in very light sandy soil, another in rather heavy clay land without manure, a third was heavily manured with farmyard manure, and a fourth was grown in vegetable mould or earth out of a trench.

None of the roots which I received for analysis exceeded 2 lbs. $5\frac{1}{2}$ ozs. in weight, and one weighed only $14\frac{1}{2}$ ozs.

The roots grew luxuriant tops, and bulbs neither remarkable for weight or good quality. In all probability the soil of all four experimental plots was naturally too rich in fertilising matter, and the differences in the results were not so striking as they might have been had the unmanured root been grown in sterile sand and poor clay loam.

The results of the chemical examination to which I submitted the specimens sent by Mr. Duncan are given in the subjoined Table:—

TABLE XIII.

COMPOSITION OF SILESIAN BEET-ROOTS GROWN UNDER DIFFERENT CONDITIONS AT CLYDE WHARF, LONDON, BY MR. J. DUNCAN.

How grown	In sandy soil.		Heavily manured.		No manure.		In vegetable mould out of a trench.	
Kind of root	Red skin.	White.	Red.	White.	Red.	White.	Red.	White.
Weight of root	1 lb. 8 ozs.	14½ ozs.	2 lbs. 2½ ozs.	2 lbs. 5½ ozs.	2 lbs. 6 ozs.	2 lbs. 3 ozs.	1 lb. 4 ozs.	1 lbs. 6 ozs.
Specific gravity of juice ..	1·0476	1·0503	1·0461	1·0398	1·0504	1·0501	1·0503	1·0425
At a temperature of	68° F.	68° F.	70° F.	68° F.	69° F.	69° F.	68° F.	68° F.
Moisture	88·21	86·02	87·32	89·62	85·63	86·47	86·71	88·10
* Albuminous compounds ..	2·12	2·86	2·63	2·38	1·60	2·12	2·76	2·74
Crude fibre (pulp)	3·07	3·59	3·21	2·54	2·87	2·65	2·58	2·86
Crystallizable sugar	4·51	5·38	4·55	3·17	7·88	6·68	5·79	3·85
Pectin, &c.	·40	·46	·35	·38	·73	·55	·40	·39
Mineral matter (ash)	1·69	1·69	1·94	1·91	1·29	1·53	1·76	2·06
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·310	·459	·421	·381	·256	·340	·443	·439

It appears from the preceding analyses that all the beet-roots produced a juice of comparatively low specific gravity, which may always be taken as a good general indication of poor sugar-yielding quality. Notwithstanding the small size of the roots the greater number contained a high percentage of water and a correspondingly low percentage of sugar.

The heavily manured beets, as might have been anticipated, were very much poorer in sugar, and contained a larger proportion of nitrogenous and saline matters, than the roots grown without manure.

Thus, one of the heavily manured beets yielded $4\frac{1}{2}$ per cent. and the other 3 per cent. of sugar, in round numbers; whilst the two unmanured beets produced $7\frac{3}{4}$ and $6\frac{1}{2}$ per cent. of sugar respectively.

The beets grown in rich garden mould were also poor in sugar, especially the white Silesian beet, and both contained an abnormally high percentage of nitrogenous compounds as well as much saline matter, which always distinguishes beets of low sugar-yielding quality.

I may further mention that I found in the heavily manured roots, as well as in those grown in garden mould, apparently considerable quantities of nitrates. The white Silesian beet grown in vegetable mould was so rich in nitrates that the dried root burned with scintillations like touch- or match-paper.

Laboratory, 11, *Salisbury Square, Fleet Street, E.C.*,
July, 1869.

XIV.—*On the Production of Successive Green Crops.* By JOHN CHAMBERS, Farm-Bailiff to the Strines Calico-Printing Company.

THE Strines Calico Printworks are in Derbyshire, distant from Manchester 14 miles, Stockport 7, and Buxton 12. They employ from five to six hundred work-people, and in connection with them is a farm of about 105 acres. Part of the land is in Derbyshire, and the remainder in Cheshire, the river Goit passing through the midst. About 50 acres are level and low-lying, the remainder being elevated. The climate is late, especially if east or north-east winds prevail in the spring, and there is not much growth before the month of May.

The stock at present on the farm consists of 14 horses, 1 mule, 1 ass, 21 cows, 13 young cattle, 26 sheep, and 3 pigs.

The horses are heavy draught horses, and are mostly used for

draught-purposes at the works, as also are the mule and ass; the cow-manure is used for dyeing purposes at the works.

A good supply of manure is obtained from the works, consisting of a mixture of human excrement, flue-ashes, and ammonia-water from the gas manufactory; also a supply of gas-lime. I have had charge of the above farm for nearly nine years, and have conducted the following operations, by means of which I have obtained a continuous succession of green crops:—

40	acres meadow land, grass cut and made into hay; aftermath grazed.
43	acres grazed.
22	acres under cultivation.
105	acres.

Sixteen acres of the 22 are about half a mile distant from the works and farmyard, and on high ground; they are cultivated under a four-course rotation, namely—4 acres oats, 4 acres swedes, 4 acres barley or oats, and 4 acres rye-grass and clover.

The turnips are pulled and carted home in October and November; the rye-grass and clover are ready to cut the first time the fourth week in June; the second cutting being ready about the second or third week in August. This for distinction I will call the 16 acres.

The other 6 acres are near the works and farmyard, and are level, with a good strong soil, gravelly subsoil, and good natural drainage. They have been devoted entirely to the production of successive green crops for the last seven years.

The six acres have been divided into five as equal parts as possible, which I will call Nos. 1, 2, 3, 4, 5.

No. 1. is manured during the autumn with gas-lime, which is ploughed in; the land is prepared during the spring; in the third week of April drills, 27 inches apart, are made; the land is manured with farmyard manure, and potatoes (the early sort) are planted in alternate drills. In the first week of May ox-cabbage plants, 30 inches apart, are put in the drills remaining (the ox-cabbage seed having been sown the previous August and pricked out during the autumn); during the months of May and June the land is hoed, cleaned, and the plants earthed up; in August the potatoes are dug and sold at once, the small and diseased ones being steamed and stored for pigs.

Immediately the potatoes are cleared the land is scarified, and the cabbages earthed up, as they will soon cover the vacant space. In October the outer leaves are taken off, and the cabbages are ready to cut in November.

No. 2.—In January or February the cabbage-stalks are ploughed out, and gathered off; the land is harrowed and

ploughed, and sown with spring tares, with rye and a few beans to hold up the crop. The sowing is made in February or March (according to weather), and the crop is ready to cut in July.

No. 3.—Immediately the tares are cleared the land is manured with manure from the works, which is ploughed in; it is then prepared for sowing Italian rye-grass not later than August. During the autumn, winter, and more especially in the spring, liquid manure from the farmyard is applied; the first cutting is generally ready to cut in the beginning of May, and the last cutting not later than the first or second week in September. Under ordinary circumstances there will be three cuttings, and if the land is well supplied with liquid manure between each cutting, there will be four.

No. 4.—Immediately the Italian rye-grass is cleared off, the land is dressed with manure from the works, which is ploughed in; and winter tares are sown, to be ready to cut in May and June. The crop is cut up in small strips at a time; and as a strip is cleared the land is ploughed, manured with manure from the works, and drilled 21 inches apart; savoy cabbages are then planted 18 inches apart (the savoy cabbage-seed having been sown in February or March, and pricked out in April or May, and held in readiness); each successive strip is treated in the same way, only, in case the last strip should be rather late, the plants are put in a little thicker there. The savoy cabbage will be ready to cut in January.

No. 5.—The cabbage-stalks are ploughed out, and gathered off as in No. 1; the land is then ploughed and sown with spring tares, with rye and a few beans to hold up the crop. The sowings are made twice, one in April the other in May; the first sowing is ready to cut in August the other in September.

Having described the mode of raising the above crops, I will now describe the mode of consuming them.

May.—A supply of Italian rye-grass and winter tares from Nos. 3 and 4 is cut and carted into the farmyard, and the greater part passed through one of Richmond's chaff-cutters (attached to steam power). When too succulent they are mixed with hay or straw chaff. All the horses, the mule, the ass, and the cows get an allowance, the young cattle being out at grass.

June.—Winter tares from No. 4, and clover and rye-grass from the 16 acres, form the supply for this month; the winter tares are now strong, and have to be cut into chaff. All the horses, mule and ass, and the cows consume tares and make room for the cabbages. When the tares are all consumed, about six of the horses are put out on the pastures during the night, and the cows are more at pasture until the next supply from the 16 acres and

the second cutting of Italian rye-grass come in. All the young cattle are out at grass; what is not required of the rye-grass and clover is made into hay.

July.—Spring tares from No. 2 now come into use; and a strong heavy crop requires cutting into chaff. To these are added rye-grass and clover from the 16 acres, and in the first week a second cutting of Italian rye-grass off No. 3. The six horses are out at pasture during the night, the cows are partly at grass, and the young cattle entirely.

August.—Spring tares are obtained from No. 5, first sowing Italian rye-grass, a third cutting from No. 3, and clover from the 16 acres if required. Six of the horses are at pasture during the night, all the others receiving green food; all the cows are at pasture on aftermath, and the young cattle are also at grass.

September.—Italian rye-grass from No. 3, spring tares from No. 5, (second sowing), a strong crop being passed through the cutting-machine, and clover from the 16 acres are got this month. All the horses receive a supply, but all the cows and young cattle are at pasture.

October.—Ox-cabbage leaves from No. 1, and turnip-tops from the 16 acres, are used this month; the horses receiving a small quantity of turnips from the 16 acres, and the cows a cart-load per day of the cabbage-leaves or turnip-tops, carted out into the meadows and spread there, so that all can be consumed. The young cattle are at grass.

November.—Ox-cabbages are got from No. 1, viz., two feeds per day for the cows, and one feed per day for young cattle (or turnip-tops); the cabbages are cut as near to the ground as possible with a strong hedging-bill; each cabbage is cut in four quarters, taking care to cleave the stalk up the middle, as there is some valuable eating in it. The horses have a small quantity of steamed turnips the last week.

December.—Ox-cabbages continue to be obtained from No. 1, viz., two feeds per day for the cows, one feed per day for the young cattle. A week's supply is always kept cut beforehand, in case frost should set in, as the cabbage breaks like glass in frost. If the weather seems settled for frost, another week or ten days' stock is got in; and if the storm should last longer, turnips are substituted; the sheep receive a few cabbages this month, and the horses get a small quantity of steamed turnips, as in November.

January.—Savoy cabbages from No. 4 are now commenced; and a supply is kept cut beforehand as in December. The cows obtain two feeds per day, and the young cattle one; the sheep also get a few, and the horses are kept the same as during last month.

February.—Same as in January.

March.—Swede turnips are used from the 16 acres, all the cows receiving two feeds per day, with corn purchased by the money got for potatoes sold off No. 1. The young cattle get one feed per day, some of them being out at pasture a few hours per day. The horses have a few steamed turnips as before, and the sheep a small quantity also.

April.—Swede turnips continue to be got from the 16 acres, all the cows receiving two feeds per day as in March, but the young cattle, being out at pasture all day, do not require any, nor do the sheep. The horses have a small quantity steamed. If the season be early, the Italian rye-grass will be ready towards the latter end of this month.

Remarks on the above.

No. 1. *Potato or Cabbage System.*—I have tried swede turnips, mangolds, and cabbages, each singly, in the place of the cabbages and potatoes, but they did not answer as well as the present system; as the cabbages are not of much size before the latter end of July, and after that the potato-tops begin to decay, and the cabbages, now beginning to spread out their leaves, would cover up the potatoes if they were not dug out. I have frequently seen the leaves of two cabbages projecting over each other several inches when the stems have been 54 inches apart; and the potatoes are readily sold to the workpeople, and realise a good price. In getting the potatoes, every alternate drill is dug out first; and in a few days the cabbages will incline over the vacant space, just like a tree over a turnpike road.

No. 2. *Spring Tares, with Rye and Beans.*—I have tried tares with oats, but could not keep the crop up; with the above it will stand either rain or wind, and not go down. If the crop did go down, it would either have to be consumed at once or made into hay, and it would leave a vacancy in the continuous supply which could not be filled up. The above crop is too heavy and strong to admit of Italian rye-grass being sown in the spring.

No. 3. *Italian Rye-grass.*—This is an excellent crop, with its three or four cuttings, and it is always ready. I have had but one failure in this crop during the last seven years, and that was caused by my not being able to attend to the sowing at the proper time.

No. 4. *Winter Tares and Rye.*—I have tried tares with wheat, but could not keep the crop up; sown with rye it is sure to stand. I have tried swede turnips, and also yellow turnips after the tares, but have not succeeded in raising a full crop, as the

season is too far advanced in this locality, as I find from experience in the 16 acres that the first or second week in May is the best time in this district; and, as the yellow turnips come in at a time when not required, I am in favour of the savoy cabbages, for I have never yet failed in raising a full crop, and the savoy cabbages come just when the others are done.

No. 5. *Spring Tares, with Rye and Beans.*—(Same as No. 2.) I have tried them with oats, but could not make the crop stand.

The spring tares in Nos. 2 and 5, and the winter tares in No. 4, ought not to be cut until they are at their full growth, if it can be avoided, as there is no second cutting like that yielded by Italian rye-grass, each cutting of which ought not to be allowed to grow too long, as by so doing it interferes with the next. There is sufficient time, after each crop is cleared, to prepare and sow or plant the next, and there will not be any failure if the dates given are attended to.

The result may be thus briefly summed up: the land has grown heavier crops each succeeding year; and, by careful management, a supply of green food has been kept up for each succeeding day in the year.

XV.—*Extract from* Professor SIMONDS'S *Report to the Committee of Governors of the Royal Veterinary College, included in the Annual Report of that Body, for* 1868, *to the Council of the Royal Agricultural Society.*

WITH reference to the specimens of disease which have been received from members of the Royal Agricultural Society, and also from provincial veterinary surgeons, it may be observed that a larger number than usual have come to hand during the year; but that communications from the former asking for a personal investigation of disease on their respective farms have been fewer than usual.

Many of the specimens possessed more than ordinary interest, particularly some of scrofulous deposits in the several organs of the body. They showed unmistakeably that this hereditary and malignant disease had been unusually rife among our established breeds of cattle, more especially the Shorthorns and Devons. A few years since scrofula prevailed to a considerable extent among the cattle brought together at the different agricultural exhibitions; but a rejection of many of the animals from competition on the recommendation of the inspecting veterinary surgeon led to a great diminution of the number of these cases, from, as was hoped, the owners of the animals ab-

staining from employing for breeding purposes such as were visibly the subjects of the malady. Scrofula, however, is not unfrequently occult, and consequently breeders of cattle may unwittingly use infected animals for procreation. Such practice will be sure to prove a fertile source of mischief, to avoid which no animal should be selected for breeding purposes whose family is known to have been affected with scrofula.

The removal of the restrictions on the transit of cattle, which had been rendered necessary by the existence of the cattle plague, early led, as had been anticipated, to a great increase of pleuro-pneumonia, mouth-and-foot disease, and other infectious maladies of cattle. So long as the restrictions upon the movement of animals along public roads to fairs and markets, or even by railway, were in force, all infectious and contagious diseases were kept in check. The system was eminently protective in its influence, and not only was the eradication of the cattle plague greatly facilitated by it, but the attacks of pleuro-pneumonia, and mouth-and-foot disease, were so much diminished as to render these maladies comparatively unimportant.

With a view to obtain exact information as to the increase of pleuro-pneumonia and other infectious diseases a paragraph was inserted in the "*Veterinarian*," as early as February, asking the members of the profession to give prompt information, not only of outbreaks of these diseases, but of their probable cause. Much valuable information was received, and in by far the larger majority of cases the occurrence of pleuro-pneumonia was clearly traceable to the introduction of newly purchased stock, and in not a few instances to the bringing of Irish cattle on to the premises.

The admission of cases of pleuro-pneumonia into the College Infirmary gave opportunity for fresh experimental treatment of the disease. Among other cases, a valuable Alderney bull, the property of Miss Burdett Coutts, was sent to the Infirmary for this especial purpose. The agent chiefly relied upon was carbolic acid, but, although it was found to possess an influence over the disease much beyond many other remedies, still it failed completely in effecting a cure. As a disinfectant, however, in cattle sheds where pleuro-pneumonia exists, the free use of carbolic acid is to be strongly recommended.

Advantage has also been taken of the increase of pleuro-pneumonia to ascertain whether any specific effect would be produced by the direct introduction of the exudation fluid from a diseased lung into the healthy lungs of an animal. For the purpose of the experiment two sheep were selected, and into the lungs of each about two drachms of exudation fluid were injected by puncturing the organs with a finely-pointed tube

attached to a syringe. The animals gave no immediate indications of suffering, and, although they were carefully watched day by day afterwards, nothing was detected that would justify the belief that they suffered in any special manner from the introduction of the morbid matter into their organisms. An important field of inquiry was thus opened, and further experiments will be required for the purpose of ascertaining whether the lungs of *cattle* can be brought into a special morbid condition by this method of introducing the fluid product of pleuro-pneumonia.

During the year the country has fortunately escaped any fresh importation of the cattle plague, but great vigilance has had to be constantly exercised in consequence of the spread of the disease in Eastern Europe. Among other countries Hungary has suffered severely, and the long continuance of the plague, both there and in other parts of the Austrian Empire, led to frequent rumours of the malady having again penetrated into Western Europe. It was even said that the plague had reappeared in Holland in the early part of September, but the inquiries which were promptly instituted proved the rumour to be entirely without foundation.

In the month of July, however, much anxiety was felt respecting the probable introduction of a new disease of cattle which had shown itself in North America, and which had been brought there by cattle from Texas. The accounts which reached this country, although deficient in precision respecting the pathology of the disease, were sufficiently alarming to lead the Government, in the month of September, to forbid the importation of American hay, excepting under bond that it should be used only as food for horses. Subsequent information confirmed the opinion which had been given that the disease was not allied in its pathology to the cattle plague of Russia, although it was almost as fatal, and easily communicated to healthy animals when coming in contact with Texan cattle. The United States Government ordered a special inquiry to be instituted, but up to the close of the year, notwithstanding the publication of the official report, the information received here was so incomplete that little more was known of the true nature of the malady. The restriction on the importation of hay was withdrawn in due time on its being shown that little or no risk was run by allowing its consumption by cattle as well as horses.

In August our flocks were again threatened with another outbreak of small-pox in consequence of the great prevalence of the disease on the continent. It was ascertained that the malady was very rife both in Schleswig-Holstein and Holland—countries from which large importations of sheep were then taking place. Several cargoes of infected animals arrived at the

different wharves of London, but fortunately the disease was promptly detected by the inspectors to the Customs, and the diseased animals were destroyed. Notwithstanding the vigilance which was observed, some sheep, in whose systems the infection was incubated, found their way to the metropolitan market, but were quickly detected by the breaking out of the eruption prior to their being sold and sent into the country.

The official inquiries which were made proved that the risk of the disease gaining foothold here was so great, that the Government did not hesitate to issue an Order of Council requiring that all imported sheep should either be placed in quarantine for fourteen days, or be slaughtered within three days of being landed. This Order proved most effective in preventing the introduction of the disease, and thus saved our flocks from being attacked with this most malignant and fatal malady. Some new experiments were had recourse to in the College Infirmary, with the fresh supply of small-pox virus, to determine, among other pathological problems, whether the temperature of an infected sheep would rise early in the latent or incubative stage of the disease, as it is known to do when the system has received the morbific matter of cattle plague.

In every instance the temperature rose from 102° to 105° Fahr., thus affording a good practical test of determining the incubation, or otherwise, of the infectious matter in the organization of sheep exposed to small-pox.

In a former report attention was directed to the rapid spread of parasitic diseases among domesticated animals, and the serious losses the owners of stock were sustaining therefrom. These losses have not been materially diminished as yet, nor can we hope for much benefit until science is enabled to throw additional light on the mysteries which surround the development of parasites in general, and of entozoa in particular. From time to time, as opportunity offers, inquiries of this kind will be prosecuted. During the year, young sheep suffered to a serious extent from *filariæ* in the wind-pipe, and also from another variety of entozoic worms which locate themselves in the stomach.

Numerous cases of hydatids in the brain of sheep have also been received at the College, and further experiments are being carried out in this direction, although it may be said that the natural history of the brain hydatid is pretty well understood. Special advice has been given to several persons who sought assistance in consequence of the existence of disease in their flocks from the brain hydatid, and it is believed that benefit has resulted in not a few instances.

The disease known as "rot" prevailed in some districts,

but the long continued drought and high temperature which existed during the summer would lead to the conclusion that the entozoa on which this disease depends had entered the organism of the sheep during the preceding year, and that the state of weather referred to had acted beneficially in enabling the sheep to withstand the exhausting effects of the entozoa for a longer time than usual.

On several occasions during the year our attention was directed to cases of accidental poisoning of cattle and sheep by articles of diet, particularly by adulterated cake. The chemist of the College has been kept actively employed in investigations of this kind, and in many instances he has been enabled to detect the precise cause of mischief. In not a few, the deleterious agent was shown to be a variety of the mustard plant, the seeds of which had been commingled with linseed and other ordinary articles used in manufacturing cake for feeding purposes.

Notable, however, were the numerous cases of poisoning which occurred in the autumn among young cattle, in particular from eating acorns. Much mystery surrounded the early instances of the kind, and it was with some difficulty that even scientific as well as practical men could realize the fact. The investigations which were personally made, in different and far distant localities, soon showed that acorns eaten to excess were a powerful vegetable poison. The losses in some individual herds were very heavy; full 75 per cent. of the diseased animals succumbing to the effects of the poison. Extensive publicity was given to the circumstance, which doubtless had a very beneficial effect by leading persons to remove their cattle from parks and feeding grounds on which oak trees abounded.

Having now directed attention to the chief points of interest connected with cattle pathology which occurred during the past year, I have, in concluding this report, to describe the results of certain experiments undertaken with the view to determine the contagious nature, or otherwise, of the disease known as "foot-rot" of sheep. The experiments extended over several months, and various methods of introducing the matter discharged from diseased sheep into the feet of healthy sheep were adopted. Inoculation by direct incision of the skin between the digits was found to produce considerable irritation, with discharge from the surface, and in one or two of these instances fungoid growths followed the morbid action which was set up. In each case, however, the animal recovered in a week to a fortnight without any treatment being had recourse to. The introduction of the discharge from canker in the foot of the horse, and also of softened tuberculous deposit from the lungs

of cattle, occasioned results which were practically identical with those which followed inoculation with the matter of foot-rot. Some of the sheep used in the experiments contracted the disease in their hind feet after long association with diseased animals. But as it was doubtful whether the disease had not resulted simply from long standing on wet litter, and not from contact with the matter of foot-rot, other experiments were undertaken to decide the point. Some discharge from a diseased foot was daily rubbed upon the skin uniting the digits of sheep, which had resisted the effects of dirt and moisture for many weeks, and in each case a disease possessing all the characters of foot-rot resulted.

It would appear, therefore, that under favourable circumstances mere contact of the discharge with the skin will suffice to develop the disease. It is, however, established by other experiments that no such disease will follow if the animals are kept on dry ground, and allowed natural exercise; and further, that the most advanced form of foot-rot will quickly give way, and ultimately yield entirely to such means as these, without the application of any remedies to the affected feet.

XVI.—*Farm Reports.*

In the Report of the Council read to the General Meeting of the Society last May, it was stated, that "The Society already possesses in its Journal valuable reports on the agriculture of most of the English counties. Several years, however, have elapsed since many of these reports were written, and the Council feel sure that in the present more advanced state of agricultural practice and science, there is still much of interest to record in different localities. They have therefore thought it advisable to obtain more detailed information as to the management of particular districts, and for this purpose special farms have been selected, to which gentlemen deputed by the Council have recently paid visits."

The following reports are the results of the visits of either Mr. H. H. Dixon or myself, accompanied in every case by a member of Council. Mr. Dixon visited the Hill and Half-hill sheep-farms, accompanied by Mr. Jacob Wilson; and Mr. Parkinson's South Notts farm in company with Mr. Torr. That gentleman was also so kind as to give me his valuable aid on the Yorkshire Wolds, in North Notts, and at Castleacre. In obtaining materials for the report on a Midland clay-farm (Mr. Bomford's), and for that on Mr. Rawlence's sheep-farm, I received

the assistance of Mr. C. Randell of Evesham. A visit was also paid to the Cheshire dairy district by Mr. T. Statter and myself, but a press of other matter has obliged me to reserve this report for the next number of the Journal.

Quoting again the words used in the Report of the Council, "it is hoped that these reports will not only record any thing peculiar in the system pursued upon the farms themselves, but will also contain much useful practical information, and prove interesting to the general readers of the Journal." They have been arranged geographically as nearly as possible, commencing with the Hill sheep-farm on the north, which is a gigantic sheep-walk, yielding only pasturage and mountain-hay, and coming gradually southwards through the Yorkshire Wolds, North Lincolnshire, Nottinghamshire, Norfolk, and Worcestershire, to a Wiltshire sheep-farm, which yields enough grass and green food to support a breeding ewe to the acre. The reader, who has sufficient interest in the subject to read these reports in this their natural sequence, can hardly fail to be struck with the immense difference in English farming caused by the variations in the English climate. Other differences, arising from variations in the soil, we have endeavoured to illustrate by maps exhibiting the *Agricultural Geology* of several of the farms.

In conclusion, it is only necessary to state that actual results have, as a rule, neither been asked for nor recorded, but particular attention has been paid to the system of farming pursued in each district, and also to the condition of the agricultural labourer.

H. M. Jenkins.

1.—*A Hill and a Half-Hill Farm*—Mr. Aitchison's *and* Mr. Alexander Borthwick's. By H. H. Dixon.

"Linhope" is a very familiar name on the Border. It well may be, as Mr. William Aitchison, who bears it by virtue of his occupancy of the sheep farm of that name on "the wild, green links of Teviotdale," is not only the largest flock master in the south of Scotland, but entitled both by his position and his ancient show prowess with Cheviots, to return thanks for "The Tenant Farmers" at the Highland and Agricultural Society's dinner. He was born at Linhope, where his father held the farm before him, and, in fact, his family have been connected with the estate of "the bold Buccleuch" for more than 300 years. "The braw braes of Linhope" lie close by the high road, about half way between Langholm and Hawick, and about a mile from the inn at Moss Paul, whose "forty-two stalls, forbye loose boxes" never lacked horses in the days of the mail and

"The Engineer." The coach road is bounded by the Dumfriesshire and Liddesdale hills; and the Linhope farm, which lies on both sides of it, extends from Castle Weary, rather more than a mile from Linhope, to Moss Paul, where Dumfriesshire and Roxburghshire are divided by two rivulets, which run into the Esk. It was at the Moss Paul Inn that the great flockmasters of the district once held their Wisp Club each March, and struck after dinner the averages for the financial year of cattle and sheep stock, "white and tarry 'oo." In days when newspaper information was much less systematic, the list of prices, which was regularly registered in the club books, had an especial value, and was often referred to, both by landlord and tenant, in order to regulate the terms upon which a lease was to be made or renewed. The club was established in 1826, but at last very few of the original members were left, and it was dissolved by consent, after having well discharged its mission. Mr. Aitchison, as being strictly "the local member" of it, was faithful to the close; but with the opening of the North British line the very inn itself was deserted.

There are nearly 3000 acres of the Linhope sheep farm. A great deal of it is on the uniformly hard and sound lea of Teviotdale, but still a large portion of it is rather wild. The rent is calculated by the amount of ewe stock it will keep, and settled with the Duke of Buccleuch's agent as the lease falls in. When a tenant quits a farm of this kind, the whole of the sheep stock is left by valuation to the succeeding tenant. Over the Duke of Buccleuch's estate the ordinary rent is seven to nine shillings per ewe, but it has been hardly half that sum. The Buccleuch leases are generally for nine years, but in the Langholm district his Grace has granted some for fifteen. The Linhope feeding is of scarcely average quality, but the farm produces a sound, healthy sheep, and carries a few score under 2000 ewes. Its highest point is Toothope, which rises to about 1900 feet, or about twenty above "lofty Moss Paul." There is plenty of the cotton plant, but nearly all of it is on the hill top, which renders it not available in hard snowy seasons, when the Cheviots lose courage, and cannot hunt the hill for their food. It has some grass along the banks of the small burns, but there is not much bog ground, and its mountain hay is not equal to that on Penchryst, which has also much the best grouse and blackcock shooting. There are three hirsells on it, with a shepherd and a boy to look after each; and it is held by Mr. Aitchison with Menzion, which has three of ewes and one of wethers, as well as Penchryst with four ewe hirsells, Stelshaw with one, and Glenkery with two. A hirsell varies in size with the lie of the ground, and ranges from 25 to 40 score. Taking

his five farms, Mr. Aitchison will lamb about 6000 ewes. The whole of them are Cheviots, as he sold off all his blackfaces when he gave up part of his Bewcastle holding.

Menzion is seven miles from the source of the Tweed, in Peeblesshire, and belongs to Sir Graham Montgomery, M.P. Mr. Aitchison lived there in his father's day, and only left it for Linhope in 1836. Its 5000 to 6000 acres contain a great deal of low ground, and the higher part runs out near to Lough Skeen. It carries about 2000 ewes and 1000 wethers, and is the only farm on which Mr. Aitchison keeps the latter. He holds it with Hope Head, another farm of Sir Graham's, which has plenty of old pasture for wintering the wether hoggs. On the Cheviot hills the wethers generally go off as two shears, but Mr. Aitchison keeps them a year longer. There is now so much difficulty in getting grass and turnips for them their first winter—as farmers keep their own hoggs and force them on for the butcher market when shearlings—that the three-year wether system is becoming more prevalent. Under it fewer wether hoggs are kept each year, but the number is sustained by keeping them a year longer. There is very fine summer land at Menzion, but it lacks grasses for winter and spring. The most elevated part of it, Gameshope, where the 2 and 3 year-old wethers are grazed, rises to a height of 2600 feet, and in a severe winter the sheep cannot reach its mosses. Practically speaking, a Cheviot sheep should have mosses for spring, and grass for the other portions of the year. Stoolbent, a root in the mosses, is a prime favourite with shepherds, as it comes early in the spring, and lasts through a great part of the winter. The shepherds have also deep faith in certain coarse grasses which do not die in winter, and they look upon deer-hair as rather spiry, but still very succulent.

Penchryst, in Roxburghshire, is perhaps the best of Mr. Aitchison's ewe farms, and it is well supplied with what are termed "kebparks," or small enclosures of from 6 to 8 acres each on different portions of the hill. In consequence of their vicinity to a station on the North British line, which runs through a mile and a half of the farm, they have all been surface-limed, at an expense of rather more than 4*l.* per acre. Each hirsell has three or four of them, and one of their peculiar advantages is, that the weaker ewes and lambs can be enclosed in them during bad weather, and fed with mountain hay. The farm belongs to Sir William Elliot, of Stobs, and runs within 5 miles of Hawick, along the banks of the Slitrigg, over nearly 5000 acres. It is not such good summer land as Menzion, but it has a larger variety of grasses, and brings through sheep quite as good in quality, and in more equal condition at all seasons of the year. It was a very true saying of old Mr. Brydon's, that

"sheep must have variety; they like, bite, and bite about." The highest elevation of the farm is 1900 feet on the top of Gretmoor, which "marches" with the Liddesdale hills, but this higher hirsell is very much aided by the cotton-grass on the lower part of it, which enables the sheep to get the benefit of it in times of difficulty. It is this growth of cotton-grass at a low altitude which is so rare in the Border counties, and gives the more fortunate Sutherlandshire men such a pull. Taking the herbage generally on Penchryst and Menzion, it is nearly as rich as Eskdale, but it has not the same succulent juices for lambs.

The farm of Glenkery, on the banks of the Temma Water, a tributary of the Ettrick, in Selkirkshire, was purchased by Mr. Aitchison about eight years ago. It lies about 22 miles from Hawick, and is a more grassy farm than any of the others. It has a greater proportion of boggy land than Menzion or Penchryst, and its 1700 acres carry about sixty score of ewes. Like Menzion, it lies high, and has a wide circle of bog-land at the base of its hills. The bogs have all been open-drained at a depth of 15 to 18 inches, at the rate of a penny per rood. The herbage is very much after the character of Eskdale Moor, which is not far off it, but that fine lea-ground, which puts ewes into condition, and abounds at Menzion and Penchryst, is wanting. It is more strictly a lamb-farm, as the rich and early bog-grasses which follow draining produce rich milk, and bring the lambs along. Like Menzion, Glenkery suffers very much in a snow-storm, and calls for great preparations during the summer months in making hay to meet a bad season.

Stelshaw, the farm which Mr. Aitchison holds under Sir Frederick Graham, in Newcastle, lies, on the contrary, so low, that a snow-storm never visits it, so as to do any permanent injury. Hence its hirsell of 26 score causes, comparatively speaking, very little anxiety.

A Border shepherd will generally have the charge of thirty score of ewes; but so much depends upon locality that, on some parts of a farm, forty score are quite as easily managed. During snow-storms, and in the lambing season, which lasts for three weeks, the shepherds always require a lad to help them. They keep their own dogs, but the lad is the subject of arrangement. Their wages consist of forty-five ewes and their produce, grass for a cow, and sixty stone of meal. It is, in fact, a flock within a flock, as these ewes run marked with the rest, and go off with their produce in the regular annual cast. In the North Highlands the shepherd generally gets paid in cash, and this is gradually becoming the custom on the Border. Their houses are invariably so placed that they may be as near to their

work as possible. Still, it is a very hard life, and their carelessness about sitting in wet clothes makes many of them the victims of rheumatism soon after fifty. It is told of an old Sutherlandshire shepherd that, when he was pressed to keep warm in his cabin during his last illness, he grumbled bitterly, and would maintain that "its keeping fra the weet maks me ill." The majority are very temperate men, except, perhaps, when a great sheep fair leads them into the paths of whisky; and, unless rheumatism lays its heavy hand on them, many go their rounds well at sixty. They are very nimble-footed as well as enduring; and with "a pocket-pistol," and a piece of bread and cheese to help them along, they will follow the tod-hunter from the dawn to the close of day.

Hill-rents and prices have risen prodigiously since the termination of the American War, when many farms were left without tenants. Sheep farming was very ruinous in 1820, and continued so up to 1832, when a change for the better gradually took place with the improved prospects of the country. In 1820 great reductions of rent were made by every proprietor of hill farms; but the price of wool was so low, that even the lower scale of rent could hardly be paid. After all, wool is the commodity which gives high profits, and supports high rents. No kind of farm-produce has been more fluctuating. In 1818, when white wool was unknown, smeared wool ranged from 33*s.* to 50*s.* per stone of 24 lbs. on the Cheviot Hills, and yet in 1822 the same quality only brought from 8*s.* to 13*s.*! At that time the total sales of wool and mutton would have done little more than remunerate a tenant who paid no rent. Low wool only exists in a time of great depression of trade, and therefore it is always accompanied by a very reduced general scale of prices. So in 1822 Cheviot top lambs only fetched 4*s.* to 7*s.* each at Melrose and Lockerbie; and, in fact, they were often killed and almost given away. In 1826, when the drought had such a ruinous effect on all live stock, there were instances of even good hill-lambs being sold at sixpence per leg. The skin was not worth keeping; and the shepherd kept the fry for himself.

Prices gradually revived between then and 1834, and rents were still thirty per cent. less than they are at present, although mutton and wool ranged higher. As land got out of lease the landlords had the benefit of the rise, as they now have of the prices of 1863-64. In 1842-43 a check came, and top wether lambs fell as low as from 7*s.* 6*d.* to 5*s.* With these two years of commercial uncertainty the bad prices ended, and ewe-rents settled at from 7*s.* 6*d.* to 5*s.* 6*d.* per sheep. In 1862 Cheviot white wool was quoted at 52*s.* to 58*s.* per stone, cast-ewes at 30*s.* to 40*s.*, and top wether lambs at 15*s.* to 21*s.* These prices lasted

two years for wool, and a year longer for stock. Farms were let on the faith of high prices, at 10*s.* 6*d.* per ewe, and those who took them did so when sheep and wool were more than twice as valuable as they have been since. Last year, when keep was so short, the best lambs went to the butcher-market, as there was nothing for them to eat at home, and they could not have been converted into cash in any other way. Besides the drought difficulty, there was an extra number of lambs ready for sale in August; and, as quality and quantity generally go together in lambs, they "died well." In fact, there were hardly any deficiencies, whereas in such years as 1816, 1837, and 1860, fully two-thirds of the usual number were wanting.

The losses among Cheviot sheep have been fearful in some seasons. In 1772 more than half of the sheep in Scotland died, and in the January of 1794, at the time of the Goniel Blast, many a farm lost its shepherd. Twelve lay dead at one time within a short distance of Moffatt. One flockmaster lost seventy score of ewes, and the mouth of the Solway Firth was almost dammed up with carcasses. Mountain hay was hardly introduced before 1799, and then it did not come into general use. Hence the black frosts of 1816 and 1837 made dreadful havoc, and in 1860 farmers could hardly keep life in their flocks at all. The snow began on October 21, and the winter could not be said to terminate until early in May. If the science of the flockmasters had not been greatly in advance of what it was in 1772, scarcely a sheep would have been left on the Cheviots. It is not, however, the hay of one season that will give a quantity sufficient to meet such a season as that of 1860; and the shepherd cannot be too urgent about making it whenever the sun shines. The greater part of it is from the drained enclosures, but still a fair quantity can be won from among the feet of the sheep. A score of sheep, fed on hay alone in a hard time, cannot do with less than 1½ stone, of 22 lbs. to the stone, per day. When there was no mountain-hay at hand, a great deal of Dutch was used, but it was sadly deficient both in weight and quality. The Border men had great facilities for getting rye-grass hay (which might be sold by the farm covenants) from Cumberland, but the cartage of it on to the hills was very difficult, and it rose from 1*s.* per Cumberland stone of 14 lbs.,* to 2*s.* in snowy weather.

There is no point of management that the older flockmasters insist so much upon as a good supply of mountain hay. In a paper which Mr. Aitchison read a few years ago before the Teviotdale Farmers' Club, of which he is president, he observed: "Sheep make up nearly half the rental of Scotland, and yet land-

* The Roxburghshire stone is 22 lbs., and the Dumfriesshire stone 24 lbs.

lords are sadly remiss, and very little is done for them. Sheep drains, sheep stells, and March fences have done much, but still more is expended on 40 acres of wet low land than would put a sheep walk in form. Corn, beans, and bran with hay may enable the flockmaster with a heavy purse and a willing heart to tide through the dreary time till verdure begins, and nature dethrones art on the hills, but still mountain hay must be the sheet anchor. Go in for mountain hay, and the storms of winter may drift up the valley, and tempests whistle over the hills in vain." Again, "partial feeding is worse than no feeding, as the sheep listlessly wait on it; and no longer, in the absence of fresh weather, search after regular food. Giving it in handfuls may do for calm weather, but sheep hecks will alone prevent the wind from pilfering, and save one third of the hay." His recommendation was that every hirsell of 30 score should have four enclosures of a few acres each, with sheep houses and hecks, which should be limed and cut two and two, in alternate years, and this plan has been pretty generally followed.

Each of Mr. Aitchison's ewes is expected to have four crops of lambs before she joins the cast. The worst gimmers are kept back when the places of the cast ewes are to be supplied, but the rest, which are kept in the general hirsell, all reckon among the ewe flock in their second autumn. The proportion of couplets is very small on hill farms, and "the shepherd is better wanting them." It requires a fine tupping season to bring them in any quantity, and hence Mr. Aitchison has the largest proportion of them in the milder climate of Penchryst, where the ewes can keep longer in condition to meet the ram. In fact, on Penchryst every fifth or sixth ewe has couplets, and they can nurse them with the aid of enclosures, but on his other farms Mr. Aitchison is glad to give the weaker lambs to low land farmers, to put on their half-bred ewes. In most seasons there is a slight majority of ewe lambs; and if a ewe nurses a couplet she has generally one-third less wool. Some flockmasters wean their lambs in August, and others let them suck on, except when they happen to be following a cast ewe. As the grass decays, the milk leaves the ewe, and she has none in her later than October. About 70 ewes is a good allowance to a ram on a hirsell, but if there is a select lot of ewes, and the following is not difficult, one ram gets his five or six score. A ram has been known to leave ten score in lamb, when they have been put to him by half at a time. They all come in season on the hills within 18 days, and not generally later than the 24th of November, and the height of the lambing is the last week in April. A hardy ram that will follow his ewes well on difficult ground is of the highest importance; and Mr. Aitchison has

found from a long winning experience at the Highland and Agricultural Society, that the best looking Cheviots are not always the most profitable. It is now nearly 20 years since Mr. Aitchison ceased to show on his own account, but last year Mr. Elliot, of Hindhope, took a first prize with a ram of his breeding when the above society met at Aberdeen. In the days when he had so many heavy "winning exchanges" with Mr. Brydon's uncle, his prize rams and ewes were almost entirely chosen from the Penchryst and Menzion farms. He sells about 90 rams in the course of the year, but principally at the Hawick ram fair, which is confined to Cheviots, and attended by the Sutherlandshire breeders. At times he has made as high as 70*l.* for one, but they will vary on the average from 3*l.* to 9*l.* Horns will come out occasionally, but they are not liked, as their possessors use them rather too freely, and are not much hardier in their constitution than those which lack them, besides being generally rather coarse in the fleece. A good ram can be fed up to about 40lbs. a quarter, and they have been known as a four-shear to clip 13lbs. of wool. The largest ram the present Mr. Brydon ever bred was Sampson, who was upwards of 24 stone of 14lbs. live weight when he was made up.

When it was the universal habit to tar the fleeces, nearly all the wool of Scotland went direct to Yorkshire. The leading Huddersfield staplers came round, and lived for weeks on the Border, examining clips by day, and drinking whisky toddy by night. For many years Eastwood, Graham, and Lockwood had a monopoly of the market, and very seldom opposed each other. It was not their custom to settle up the balance till they came for the next clip, but they made a heavy payment to the flock-master in February, so as to enable him to meet his rent. Most of the wool in the North Highlands was also consigned to Liverpool agents for sale. Since, however, white wool has become the fashion, Scotland has manufactured much of her own wool, and the clothiers of Bradford are the leading customers for the residue. The late Mr. Andrew Oliver of Hawick began the public wool sales before 1840, and his were the earliest of the kind in Scotland, but not on the same principle as those now established by Messrs. Girdwood and others at Edinburgh, Glasgow, and Leith. Catalogues of the clips were published, and buyers went round and examined them, and then met at Hawick or Jedburgh to bid. For eight or ten years past the Edinburgh and Leith firms, which have begun the system of warehousing the wool, and holding periodical sales, have done most of the Scottish wool business. Their system prevents the market from being flooded at one season; and owing to the regulation of supply, men of small capital have a chance of

purchasing what and when they want. The auctioneers pay in three weeks, and deduct 2½ per cent. for commission. Some of the firms send out bags and sheets for wool packing from the beginning of April to the end of the year. A sheet will carry 300 to 400 lbs., but those intended for exportation will take six hundred weight. Some bags will carry a third of that amount, but more usually 10 to 12 stone (of 24 lbs.) of "laid" or smeared wool, and 8 stone of white. North of Edinburgh the wool generally comes to the warehouse packed in bags, and south of it in sheets, and smearing is now almost entirely confined to north of the Frith of Forth. Mr. Aitchison has quite abjured the custom, and simply uses dips in October and November. The washing begins about the middle of June, a week before clipping time, and the sheep are put thrice through a mountain burn dammed into a basin with stones and turf. Seven fleeces to the 24 lbs. stone is his calculation for white wool throughout the flock, and an ordinary two or three shear tup (which breeders prefer to a shearling on the hills) will clip 7 lbs. Penchryst produces better wool than any of Mr. Aitchison's other mountain farms, as it is in a drier climate, and farther away from Dumfriesshire, and "the weeping West coast." He has not tried the plan of putting "coats," as Mr. Brydon does, on his dinmonts and gimmers from Michaelmas until the beginning of April. The woollen cloth prevents the rain from settling on the fleece, but some consider that it prevents the wool from rising properly.

Where the flockmasters have no wether land, the wether lambs are sold to farmers in the low districts. Melrose (August 12) has almost ceased to be a Cheviot lamb fair, and Lockerby (August 13th) has now scarcely anything but half-breds. On Carlisle Sands (August 26th) there is a great increase of Cheviot lambs each year, and so at Newcastleton (September 5th) in the Liddesdale district. These fairs are generally supplied by mid-wether lambs, as the tops have been sold privately to be fed off turnips at a year and a half. The Oliver auction mart is gradually becoming "a great fact," and superseding private sales, and upwards of ten thousand cast ewes and wether lambs have been sold there on a Monday. The wether lambs are sent to grass if possible, as they are thought to stand the winter better on it than on turnips; whereas in Sutherlandshire they are universally sent away, to be put on to turnips in Ross-shire. Taking turnips for them is a plan of only recent growth on the Border. When Mr. Aitchison commenced sheep-farming with Menzion in 1820, he and the late Mr. Brydon were the only men during the next ten years who took turnips in Dumfriesshire. The price in that county has sometimes been only 2½*d.* per week for ewes, and 1½*d.* for hoggs, whereas last year it was more than four times

as much. Those who want turnips have now to fall back upon Cumberland, as the farmers in the Scottish Border counties like to keep their own stock. In Dumfriesshire and Galloway the breadth of turnip-land steadily increases with the abolition of bare fallows, and the farmers are excellent customers to the Cheviot men for their cast ewes. The Inverness Character Market on the second Thursday in July is the guide to their price, and the buyers generally "shoot" two to the score both in ewes and wethers.

Those Cheviot flockmasters who keep wethers sell them in their second or third year, and they mostly go off at the same time as the cast ewes to turnips in Cumberland or the Lothians. In cold wet summers they suffer a great deal, and require to be finished off on turnips to get them up to 18 lbs. or 19 lbs. per quarter for the Manchester and Liverpool markets. Many of the cast ewes go to England; and last year Mr. Aitchison made 1*l*. 1*s*. 6*d*. for the Penchryst lot, which always heads his price-book. The Penchryst and Menzion lots combined have made as much as 42*s*. to go to Yorkshire. He has generally about fifty-five score of cast ewes for sale, but he has sold sixty score to one Yorkshire salesman, whose customers take one crop of lambs from them by a Leicester ram. It is the Border system to sell the ewes at six years old, whereas in Sutherlandshire they go off at a year younger, and are, therefore, preferred, as they fatten faster when the half-bred lamb is weaned. The top ewe lambs are, of course, kept to supply the places of the cast ewes next year, and the mid ewe lambs (which, as a general thing, fetch more than the top wether lambs) are sold to make up the cast on the "half-hill farms," and breed half-breds.

The farms, partly hill and arable, of Roxburghshire, Berwickshire, Selkirkshire, and Peebleshire, are mostly farmed on what is termed the half-hill system. This consists in keeping Cheviot ewes on the hill part of the farm, and taking three or four crops of half-bred lambs by a Leicester tup from them. The system generally prevails in the districts not more than 700 feet above the level of the sea, and the small half-bred ewe shots are made quite as good as the top Cheviot wether lambs. Those farmers who follow it regularly buy from the hill-farmers two-fifths of their Cheviot ewe lambs each year, in order to keep up their stock. It is found five miles up Teviotdale beyond Hawick, and extends up Kale and Bowmont Water to the foot of the Cheviots, all along the banks of "the shallow, brawling Tweed," Gala, and Leader, beyond Peebles, and nearly to Lanark.

"Drygrange with the milk white ewes
'Twixt Tweed and Leader standing"

is faithful to it, and in the Vale of Yarrow every one breeds half-breds if his land is low enough, and he has plenty of winter-keep. In the Bowmont Water District the farmers go a step further, and use Border Leicesters to the four or five year old prime Cheviot ewes, which are then in the very height of their milk, in order to breed half-bred rams for the Kelso ram fair. Breeders are very particular about these rams, and some of them go to Sutherlandshire for picked ewes to breed them from. Those who breed half-breds give the ewes six to eight weeks of turnips in winter, or they could never nurse their much heavier lambs. Hence half-bred lambs increase marvellously in the ranks at Melrose Fair. There have been from seventy to eighty thousand on sale there, with the ewes and wethers always separated; whereas five-and-twenty years since fully half of them were Cheviots.

Mr. Borthwick, of Kilham, has departed from this half-hill system only in this respect, that he uses half-bred, instead of Cheviot ewes. A short ride from Hawick to Kelso, and then along the banks of the Tweed, through the very heart of the pastures where the famous Mellendean rams were grazing, brought us to Cornhill, a small village, where the Northumberland Society held its meeting last year, and the nearest station for Kilham. From thence we strike some four or five miles inwards towards the spurs of the Cheviots. The road lies through the rich turnip and barley soils of Campfield. In front are the farms of the Learmouths, names very familiar to the parliamentary ear some thirty years ago, when the Corn Laws were the topic of the hour, and the fall in their rentals was regarded as a significant barometer. Mindrum, which stretches away towards Yetholme, and contains the boundary-fence of Northumberland and Roxburghshire, and Mindrum Mill—the fine holdings of Mr. Charles Borthwick and Mr. Lynn—are on our right, till we ride down Bowmont Water. The rich holms through which it runs are flanked by the steep hill sides of the farms of Downham and Thornington, whose tenant has sold many a good hunter to Earl Wemyss. The incline is so great that the man has a complete "oversight" of his horse as he drives his turnip-ridger; and, as we approach Kilham, we find the female turnip-hoers working thirty strong, unicorn fashion, and some of them taking their mid-day siesta, full length, among the well-thinned rows.

Kilham is the property of the Earl of Tankerville—who owns pretty nearly alternate farms with Earl Grey along the road from Cornhill. The present tenant, Mr. Alexander Borthwick, entered upon possession as successor to Mr. Boag, in 1844. Of the 2050 acres, about 800 are arable, 150 of which are in turnips; and

the remainder in old grass and hill. Kilham Hill is only 1200 feet above the sea-level, and barely half the height of Cheviot, which rises some 6 miles to the south of it. It is what is called "white land," with short green grass, which will not make mountain-hay, and is rather benty in its texture above 500 feet. There is scarcely any heather, but plenty of fern in the ravines, which shelters a few grouse, and even partridges may be found on the top. The hill is remarkably well watered by natural springs, which are cleaned out yearly, as well as by the burns at its foot. Hardly three trees are to be found on it, but one or two thick thorn hedges steal half-way up, and often help to break the storm for the ewes. It looks down on Flodden Field in the distance, the site of which is marked by a few fir-trees near Marmion's Well, which has been restored by the noble mistress of Ford Castle. The scene of the battle is all cultivated ground, and if no "battle sheaves" are garnered to tell of that bloody day, an old spur or dirk is occasionally turned up by the ploughshare.

Kilham Hill is too good for Cheviots, and hence Mr. Borthwick farms it with a thousand half-bred ewes. Half-breds to half-breds has been his system from the first. The germ of his ewe-flock is to be found in a careful cross between the Cheviot and the Border Leicester, which is kept up annually with gimmers from its own ranks. To use his own expression, "The ewe never changes," and on the next hill the ewe-flock of his brother, Mr. Charles Borthwick, has gone on ever since 1811. In order to keep the blood as pure as possible he has a separate flock of forty picked cast Cheviot ewes, to cross with Border Leicesters, for the purpose of breeding the half-bred rams. These Cheviot dams have been principally selected from the flocks of Mr. Elliot of Hindhope, Mr. Wilson of Raeburn, Mr. Sheil of Sourhope, and Mr. Shortreed of Attonburn, while the Kelso September fair always furnishes 2000 Border Leicester rams for choice. The ewes have three crops of lambs, and the cast, which is generally 300 strong, is sold by auction each September. It has been Mr. Borthwick's practice for eight years back to have a displenishing sale in the autumn, and during the rest of the year no sheep stock is sold off the farm. The top ewe lambs out of the flock take the place of the cast ewes, and the rest of the ewe lambs are sold as gimmers, but kept in an inferior way to the wether lambs, which go off as dinmonts.

The ram begins to run with the ewes on the hill about Gunpowder Plot day, and the lambing commences on or about April 8th. Nearly two months before lambing time the ewes leave the hill, and have turnips on the grass-land below.

Like the Cheviot breeders, Mr. Borthwick has no wish for

couplets. What little rape he sows is used by the dinmonts in autumn, when they are penned on the field with sheep-nets. The five-course shift, to wit—two years' grass, oats, turnips, and barley or wheat is adopted. White globes, Aberdeen yellows, and swedes, are the three varieties of turnips, but fewer swedes are sown every year, as the Aberdeen yellows have more bulk.

The gimmers do not go on to the hill in their first year, but are weaned at a hill-farm, or, rather, kept on moorland for eleven weeks, and then taken to stubbles and turnips. On the stubbles they merely follow the dinmonts, and reach the hill in due course about April 1st. They never see a swede, or any kind of turnip, except the grass on the hill is not ready for them by that time. The dinmonts go as lambs to a weaning farm, and come back from thence to get the first run of the stubbles, and then their full share of the turnips. They have plenty of swedes, and never see the hill again, and then go on to seeds. About five score of "the tops" are forced on Indian corn, tares, and oats—just to show what they can do—up to 23 lbs. a quarter, and are bought at the auction by butchers, while salesmen take the rest to have another "dip" on turnips. In the September of 1866, a score of the best dinmonts made 3*l.* 7*s.*, as many gimmers 2*l.* 8*s.*, and cast half-bred ewes 2*l.* 10*s.* The fall in wool and mutton during the next two years was such, that the Cheviot cast ewes came down from 31*s.* to 18*s.* 6*d.*, and the half-bred dinmonts, cast ewes, and gimmers, to 50*s.*, 31*s.*, and 22*s.* respectively. Sheep only are brought to the hammer by Mr. Donkin at this autumn sale, and Yorkshire, Northumberland, Roxburghshire, and Berwickshire, furnish the majority of the buyers.

The dry subsoil and total absence of clay on the farm are not favourable to the growth of wool, and it generally takes seven fleeces to make up the tod of 28 lbs. A good half-bred tup will cut to about 9 lbs. if fed on turnips; and Mr. Borthwick has found that his half-breds preserve the mean pretty accurately between the "bred" or Leicester, and the Cheviot. The wool is bought up by dealers from the Bradford district. An early hill and good autumn grass in this district are the chief makers of wool, and last year's clip was especially good both for quality and quantity. We found the clippers, six in number, busy at work last June, with a young woman as fleece lapper, and a girl presiding over the pitch cauldron and the marking iron. Each man generally clips about thirty a day. Such were our experiences of a hill and a half-hill farm.

2. *Eastburn Farm, near Driffield, Yorkshire,* occupied by* MRS. JORDAN. By H. M. JENKINS.

The Eastburn Farm was taken by the late Mr. Jordan in 1849 at an annual rental, subject to a tenant-right agreement, from Lord Hotham and Mr. Bosville. It lies about 2 miles west of Great Driffield, and is approached from that town by the road leading through Kellythorpe westwards to Kirkburn. Eastburn is a hamlet of the parish of Kirkburn, and forms the extreme eastern portion of it. The farm extends over the whole area of this hamlet, measuring 900 acres, and it includes also about 400 acres in the hamlet of Battleburn. The junction of Eastburn with the adjoining parish and farm of Kellythorpe on the east, is marked on the Ordnance Map by a dotted line, which, on crossing the high road to Kirkburn, undergoes a z-like twist at a point marked "Brick-kiln Corner." From here the boundary of the farm, which is coincident with the dotted line, proceeds northwards for three-quarters of a mile; it then turns north-west towards the Malton and Driffield Junction Railway for about a mile, and, just before reaching the railway, takes a due-west course for another mile or more, following the bye-road, and crossing the high road from Kirkburn to Garton-on-the-Wolds near the figure "100." About half a mile west of this high road the farm-boundary makes a sudden turn southwards for about a mile and three-quarters, and exactly opposite the fork in the Warren roads it turns again as suddenly eastwards until half-way to them, then it proceeds again south to join the high road from which we at first started, near Kirkburn. South of the high road is an area of a triangular form, to which we shall presently refer more particularly, as it consists entirely of permanent pasture; at present it is sufficient to mention that the northern side of this triangle is formed by the high road, the other side by the Eastburn beck-drain, or Carr, and the base by the southern continuation of the dotted line on the map, with which this description commenced.

The area thus defined is a spur from the Yorkshire Wolds, situated at their extreme south-eastern edge, and taking an easterly direction. The varieties of soil found on different portions of it

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* I am under considerable obligations to Mr. J. S. Jordan, of Elmswell, Driffield, and Mr. John Staveley, of Dotterill Park, Driffield, both of them the executors, and the former also the son of the late Mr. Jordan, for their kindness in furnishing me with the information contained in the following pages, and for their assistance in subsequently correcting the report. I have also to express my thanks to Mr. J. Wheatley, of Neswick, Driffield, for the trouble which he has taken in pointing out to me practical matters which would otherwise have escaped my notice, and for his disinterested assistance in many other respects.

Fig. 1.—*Map of Eastburn Farm, near Driffield, showing the Surface Geology*
After a Survey by J. R. Mortimer, Esq.

bear a tolerably strict relation to the accompanying physical features; and the divisions of land appear to be the same as those which prevail over the whole Wold range. It is, therefore, desirable to give a short description of the geology of the Wolds, so far as it bears on the distribution of soils. Fortunately this can be done clearly and succinctly, as Mr. J. R. Mortimer, of Fimber, near Driffield, a well known local geologist and antiquary, has kindly given me a description of it, which is contained, almost verbatim, in the following paragraphs * :—

"The Yorkshire Wolds consist of chalk, which in many places and at all heights is capped with a few small outliers of late drift-clay and sand, and in many of the valleys of which a deposit of gravel is found.

"(1.) The first and most extensive subsoil-area is that of the rubbly chalk, which is generally found immediately beneath the thin surface-soil on the northern and western escarpments of the Wolds, as well as on the southern and eastern slopes above an elevation of about 100 feet above the sea-level. On these slopes the surface-soil varies from 4 to 8 inches in depth; it is light and porous, and contains a large quantity of small chalk-rubble, with flints of various sizes, both derived from the disintegrated rock beneath.

"(2.) The next extensive subsoil-area is that occupied by the outliers of late drift-clay which rest on the chalk, and which in a few places are substituted, and in others accompanied, by beds of a sandy character. In some places this description of subsoil is represented by a peculiar stiff earth, covering the chalk-rock to a thickness of from 1 to 4 feet, being sometimes of a loamy character, almost free from flint and chalk-rubble, and at others remarkable for containing a great quantity of native angular flints stained with ferruginous matter, though wanting in pieces of chalk. The soils on this deposit, which is mostly found on the hill-tops and the northern and western sides of the Wolds, are cold and 'unkind,' though deep, and in mineral character very much resemble the beds beneath, being, except where marling † has been done, easily distinguishable by the absence of fragments of chalk (See No. 3 on the map.)

"(3.) The third, and least extensive, subsoil-area is occupied by a much water-worn chalk-gravel, containing angular and sub-angular flints, and a few pieces of transported rocks—such as

* Mr. Mortimer has also been so kind as to survey the farm for me, and construct a geological map of it. This map is given on the opposite page, and I can vouch for its accuracy, as it accords very nearly with one which was made by myself on the occasion of my visit there, in company with Mr. Torr, to obtain the materials for this report.

† A large area of these deep soils has been marled during the last twenty years, but the greater portion has been done during the last ten years.

granite, trap, quartz, and sandstone—most of which are more or less rounded by aqueous action. This subsoil occurs on the bottoms of most of the Wold-valleys; and in some places it reaches a little way up the skirts of the hills. It is covered with a thin open soil, much mixed with material from the subsoil (See No. 4 on the map).—J. R. M."

The spur of chalk on which the Eastburn Farm is situated is covered on its northern side with the gravel just described as No. 3 (marked No. 4 on the map), the top-soil being very thin and light, especially in the lower ground near the railway, where it is gravelly. The higher ground exhibits a soil gradually increasing in strength and depth as one ascends the hill, and near the highest ground, namely, near the Warren, the gravel subsoil ceases, and its place is taken by the drift clay described by Mr. Mortimer as No. 2 (marked No. 3 on the map), which is here covered with about 18 inches of soil. Near the junction of these formations, and also on the other side of the drift clay, the underlying chalk comes so close to the surface, that it might almost be mapped as actually cropping out.

The geological features of the remainder of the farm are very peculiar, and are best described by Mr. Mortimer, who says, "The subsoil of the most southern division—the Carrs—consists of slightly raised banks of chalk gravel, between which are beds of peat, and occasionally clay (marked No. 1 on the map). From under the northern side of these a 'loamy clay' containing boulders (marked No. 2 on the map), crops up, and reaches northwards a considerable way up the southern slope of the chalk formation. The feather-edge of this 'loamy clay' is but a few inches thick at its northern limit, and rests immediately on the chalk."

The soil upon this portion of the farm partakes of the nature of the subsoil, and its thickness follows a rule precisely opposite to that prevailing on the gravel land to the north. Instead of the depth and strength of soil increasing with the height, the opposite is now the case. The only essential physical difference in the two cases seems to furnish the explanation of this anomaly, namely, that we now have to deal with a *wet* valley of very slight slope, the soil on the sides of which consists of the mud (or warp) deposited by the stream in times gone by; whereas in the other case the valleys are dry, and their slopes have been denuded of any alluvial soil which may formerly have covered them, by an agency which has also deepened the valleys, and increased the pitch of their sloping sides.

The farm consists, therefore, of two natural subdivisions, the northern of which, being the lighter land, is almost entirely arable; and the southern or stronger portion, one-half of which is

permanent pasture. The arable land should, for our purpose, be again divided by the road which leads from Elmswell to Kirkburn. The eastern portion was under cultivation when the farm was taken by the late Mr. Jordan; but the western, consisting of 450 acres, was at that time a rabbit-warren, and is even now known as Eastburn Warren, or the Warren Farm.

The gravelly land of this warren was so sterile, that tradition says it would not even grow twitch; but Mr. Jordan, after giving it a good dressing of bones, essayed to grow a crop of turnips on it, much to the astonishment of his neighbours and servants. His success was not brilliant the first year, but what few roots he did obtain were fed off by sheep, with a liberal allowance of cake. The next year he again attempted to grow turnips, and this time obtained a good crop, which was disposed of as before; after which the land was cultivated for many years on the four-course system, and, by a continued liberal use of artificial manures, it has been rendered tolerably productive.

The stronger loamy land at the Warren was subjected to another process. This land was of much better quality, and had produced good crops for some years, when the turnip-crop began to show symptoms of disease—a frequent occurence upon freshly broken-up old leys. The corn crop also suffered from mildew and blight. Mr. Jordan therefore applied, as soon as opportunity permitted, 6 chaldrons of lime to the acre, with excellent effect. The succeeding crop of turnips, instead of exhibiting "finger and toe," and otherwise diseased roots, yielded good healthy roots and proved a full crop; while the wheat crop was distinguished by brighter and stronger straw and the absence of mildew and blight. After such marked success, Mr. Jordan was encouraged to repeat the liming as the rotation allowed, and this process is now in course of completion.

Fences.

Proceeding along the high road from Kellythorpe to Kirkburn—about a mile of which is kept in repair by Mrs. Jordan at a cost of 100*l.* per annum—one is struck with the uniformity of the quick-fences, in height, form, compactness, and symmetry; with the straightness of the hedgerows, and with the contrast presented by the land on the two sides of the road. On the left hand, immediately after arriving at the commencement of the Eastburn Farm, the fields are picturesque and pastoral, studded with a sufficient number of trees to throw into strong relief the straight, trim, well-kept fences which divide the land into about 30-acre closes. On the right-hand side of the

road the land is entirely arable, and scarcely a tree breaks the neat and pleasing monotony of alternation furnished by square field and straight fence. The homestead stands on the pasture side of the high road, about midway between the east and west boundaries of the farm; and from that point, looking northwards, nearly two-thirds of the arable land can be seen at one glance. The fields, with their various shades of green, and brown, and white; and the hedges, with their identity of form, colour, and size, give the impression of a large garden divided into beds by prim box edging, rather than of a farm where nothing is done that will not *pay*.

The fences were made by planting on the level nine quicks in the yard. They have been trimmed once a year on both sides at a cost of $3\frac{1}{2}d.$ per chain, including raking up; and have thus been kept to a height of from 4 to 5 feet, of a somewhat triangular form, the base measuring a little more than 4 feet across the water-boughs, the sides being slightly convex, and making an angle of about 45° at the ridge. The fences show the variation in the quality of the land with as much precision as a thermometer will indicate variations in temperature. Accordingly there is a perfect gradation from the most luxuriant fences on the pastures to the comparatively stunted ones in the gravel bottom.

In 1849 and 1850 Mr. Jordan divided the Warren Farm into fields, and made the two main roads which run through it towards Elmswell and Garton. He levelled 6 miles of warren sod-walls, planted 20 miles of quick-fences, and protected them with 40 miles of post and rail. Most of the fields on the Warren are about 60 acres in extent; at Eastburn the majority run about 30 acres, though some range up to 60.

Ponds.

The farm is thoroughly well supplied with water by a number of wold-ponds, which are perfectly circular in form, and are placed either in the line of a fence, or where three or four fences join; thus supplying two, three, or four fields. The straight line of the hedge-row is thus abruptly stopped; but the fence is continued all round the pond quite as carefully and neatly as elsewhere, access to it being obtained through a gateway from each field which it supplies. These ponds are about 20 yards in diameter, and have a depth of about 5 feet in the centre, the bed having the shape of a basin, or a segment of a hollow globe. The bed is made of about 6 inches of well-beaten puddled clay, resting upon a good layer of quicklime, another layer of which is then laid upon the clay, and the whole is

covered with chalk and gravel. Each pond is made at a cost of about 20*l.*, including leading.

Grass-Land.

With the exception of 45 acres at the Warren Farm, all the grass-land is, as already mentioned, on the south side of the road leading from Kellythorpe to Kirkburn. At the latter village the road crosses the stream, making the apex of a triangular area, the base of which is formed by the boundary-fence between Eastburn and the adjoining farm, one side being the stream, and the other the road. This triangular area measures about 250 acres; it consists of the best and strongest land on the farm, being a deep soil on loamy clay, and is, therefore, the best adapted for permanent pasture, which in the Wolds is a very valuable portion of a farm. The quality of this pasture has been much improved during a series of years by the liberal use of linseed-cake, roots, &c. It is mostly stocked with from 100 to 120 head of young beasts, which, when older, are fed in the foldyards. The young draught-horses are also kept on the pasture-land, and in the summer the whole of the cart-horses; but sheep are chiefly put on seeds. The close of grass-land near the stream, consisting of about 60 acres, and known as the Carr, is the only portion of the farm which required drainage. It was accordingly thoroughly drained by the late Mr. Jordan, and the effect can be computed by comparing it now with undrained pastures in the district in a similar situation.

The Warren grass (45 acres) was laid down about twenty years ago, and was soon afterwards dressed with bones, a second dressing being given about seven years afterwards. In the interval it received liberal dressings of foldyard manure, and about five years ago it was treated with 2 cwts. of guano to the acre. Early turnips are given to the feeding beasts on this grass-land about the end of September, before they are put into the foldyards. This grass is not so good as the older pasture, but is very valuable on a Wold farm. A very small quantity of hay is made at Eastburn, no more than is requisite for riding-horses and for animals in sickness.

Arable Land.

The arable land, comprising about 1050 acres, is farmed on a four-course system, which is partly extended to a seven-course on account of clover sickness. This disease appears to be particularly rife on those farms where the subsoil consists of any description of chalk. When Mr. Legard wrote his essay on 'The Farming of the East Riding of Yorkshire,' the necessity of modifying

the old four-course system was commanding serious attention, and compelling a general resort to experiments on a large scale, which, however, were held to be merely tentative 'makeshifts.' Tares, and in some instances peas, had been tried and found unsatisfactory substitutes for clover, chiefly on account of their proving "prejudicial to the succeeding corn crop." On the deep Wolds rape had been tried, and though a better crop of wheat was stated to be the result on the credit side, yet, on the other hand, this crop was not available "in the spring and early summer, when sheep meat is most in request;" and upon the shallow Wold soils we learn that it could not be grown. The favourite system twenty years ago was, therefore, to take seeds on only one half of the course, and turnips on the remainder. On the Eastburn farm a different system has been pursued; it has been attended with the double advantage of avoiding clover sickness to any great extent, and of admitting the growth of both wheat and a certain quantity of barley, a practice which could not be profitably followed on this farm when worked on the four-course system. The shift now followed may be described as an extension of that system to a seven-course shift, namely (1) wheat, (2) turnips, (3) barley, (4) peas, (5) turnips, (6) oats, (7) seeds; but, in point of fact, only a small portion of the farm is annually under the system; the remainder is kept on the ordinary four-course, the spring corn being oats instead of barley.

On some Wold farms the relative positions of wheat and oats in the rotation are reversed, seeds being sown upon wheat after turnips, and oats following the seeds. This plan is adopted because it is not safe to grow wheat after seeds on certain cold deep soils. Although on this particular farm wheat is taken after seeds, it may be useful to recal attention to the reason given by Mr. Legard* for the contrary practice, which is followed on some other farms, as an indication is thereby afforded of the peculiarities of the soil with which we have to deal.

"The reason why the earlier mode of wheat after seeds has been abandoned is this, that on these [the deep Wold] soils, and in this climate, the wheat plant was found to be very apt to be turned out in the spring if sown on clover-lea, and that no system of rolling or of treading with sheep could counteract this tendency. Upon these soils, also, wheat of a finer quality is obtained after rape or turnips than according to any other method. Upon the thin Wold soils the very converse of this takes place; wheat after turnips does not here succeed well; the quantity per acre is invariably found to be deficient."

1. *Wheat.*—On the stronger land the seeds are manured in July, immediately after turnip sowing is finished, with about

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* 'Journal Royal Agricultural Society,' vol. ix., p. 112.

three or four ordinary waggonloads to the acre. By this means the growth of the clover is greatly accelerated, and a good top is obtained to plough in. This herbage has been proved to be of the greatest value to the succeeding crop of wheat. About the middle of October the land is ploughed to a depth of four inches, a presser with drill attached following the plough, and drilling about 3 bushels of seed to the acre. The principal kind grown is the Browick red, about 1 bushel of a white sort being mixed with 8 bushels of the red. Previous to sowing the seed is dressed with a strong solution of arsenic dried up with quick-lime.

All the strong land wheat is got in by the first week in November, if possible; because, owing to the severe winter climate of this district, it is most important to secure a strong plant before the frosts fairly set in, otherwise a very large proportion of it is lost during the winter months.

The light land for wheat is ploughed and pressed earlier than the strong land, the same quantity of farmyard manure having been used. It is allowed to remain five or six weeks, and is then drilled with the same kinds and quantity of seed as the strong land, athwart the ploughing, wheat sowing being completed by the second week in November.

In February the light land wheat receives a top-dressing of guano and salt distributed broadcast, and in the first fine weather the land is harrowed and Cambridge rolled.

Wheat is cut by a reaper unless it is too much lodged, or the crop is too heavy. After cutting it is sheafed and immediately stooked. Mowing with the scythe, whether wheat, barley, or oats, costs on an average 10*s.* per acre, including sheafing, stooking, and raking; and when stacked the thatching is done at the rate of three-halfpence the square yard, including drawing the straw from a straw rick and cross-banding.

Leading is done with a pair-horse pole-waggon; and the corn is stacked in carefully made round ricks, each of which contains enough for a day's threshing by a portable steam engine.

2. *Roots.*—The wheat stubbles are ploughed five or six inches deep in the autumn, immediately after wheat sowing is finished. As soon as the land is dry enough in the spring it is cross ploughed, or "quarted." After the usual amount of dragging and harrowing, the land, especially that intended for swedes, receives as much foldyard manure as remains available after manuring for the wheat crop, being that which is made during the latter part of the year. It then receives a third and last ploughing—an operation which is regarded as most essential in the case of swedes. On the seven-course system there are, as already stated, two

courses of roots, making in a farm of 1050 acres, 300 acres devoted to those crops every year. Of this quantity 20 acres are sown with rape, one half of the remainder with Skirving's King of the Swedes, and the remaining half with green and white globe turnips. No mangolds are grown. Swede sowing commences about the last week in May, and is finished during the first week in June, $2\frac{1}{2}$ lbs. of seed being drilled to the acre. Turnip sowing follows immediately, with about 2 lbs. of seed per acre; and rape sowing is finished by about the last week in June. All roots are sown on the flat, the rows being 26 inches apart. Ridge-sowing has not been tried, as the land is very loose, and the plan adopted enables it to retain moisture longer than is possible when ridge-sowing is practised.

The bulk of the farmyard manure having been used for the wheat crop, great attention is paid to the compost of artificial manures, &c., used as a dressing for roots. Early in the year large quantities of half-inch bones and superphosphate are mixed together, at the rate of 8 bushels of the former and 4 cwt. of the latter to every acre of turnips, as well as a certain quantity of ashes. This mixture is allowed to remain in a heap for a month, when it is turned, moistened with tank-water, and covered again with ashes. The liquid manure, besides adding a little to the strength of the compost, performs the more important function of assisting in the solution of the half-inch bones. On its addition to the heap the temperature becomes in a little time very perceptibly raised, and this "heating" is caused by the combination of the water with *free* sulphuric acid. If the water or liquid manure did not, soon after its application, raise the temperature of the mass, it would be a tolerably sure indication that this addition to the heap had ceased to be beneficial, and had begun to be hurtful. When ready to put on the land the mass yields about 3 quarters to the acre, the quantity of ashes added having been about equal in volume to that of the bones and superphosphate, and this mixture is drilled with the seed on the whole of the land for turnips.

The Eastburn crop of swedes last year was the finest in the neighbourhood, and quite an average crop for the district, where roots are very difficult to grow; but it should be observed that the practice of manuring seeds in July is not adopted by all the farmers in the district, many preferring to apply the farmyard manure the previous autumn, the argument in favour of this plan being that it strengthens the young clovers during the winter, and enables them to carry more stock the following summer. Some farmers also prefer manuring for the turnip crop instead of for wheat.

The plan adopted in purchasing superphosphates with a view

of preventing fraud, and of enabling the farmer to know the strength of the manure which he is using, appears sufficiently good and effective to be worthy of record and recommendation. 26 per cent. of soluble phosphate is guaranteed by the *maker*, and the amount actually received is ascertained by the *purchaser* forwarding to Dr. Voelcker for analysis a sample from the bulk, taken by himself. Payment is made according to the result of Dr. Voelcker's analysis, any deficiency in the percentage of soluble phosphate imposing on the manufacturer a fine, or deduction from the standard price, at the rate of 3*s.* per cent. per ton, while, on the other hand, any *excess* in the quantity of soluble phosphate has to be paid for by the purchaser at a similar *addition* to the standard price.

This plan has been found to answer admirably at Eastburn, and at several other farms in the neighbourhood; but some farmers still prefer to dissolve the bones themselves, although there can be little doubt that, *provided the superphosphate be good and pure*, it is far more economical to purchase it ready made, as in most cases there is a great waste of sulphuric acid,—the *modus operandi* being somewhat unscientific.

When the turnips are well above ground they are horse-hoed between the rows, and when the plants are large enough they are hand-hoed by a man with a 9-inch hoe, and singled by a boy who follows him; a second horse-hoeing between the rows is then given, and hand-hoeing and singling are repeated at a cost of 6*s.* per acre for the hand-operations. All the roots are consumed by sheep on the land, except about one-tenth, which portion is carried into the foldyards and eaten by feeding beasts. The sheep have an allowance of oilcake with the turnips, as will be described presently.

3. *Spring Corn.*—Barley follows turnips before peas or tares, and oats with seeds follow turnips as the general crop of spring corn. After the roots have been fed off, the land is ploughed three inches deep, as soon as possible, to get into it what frost there may be during the winter and early spring, as no tilth is equal to that produced by frost. In the spring it is harrowed, and drilled with 3 bushels of Chevalier Barley about the end of March, or 4½ bushels of Black Tartarian Oats in the beginning of April. A sufficient quantity of each kind is sown every year in seed-beds, so as to provide true seed for the following season. The seeds are sown upon oats, and not upon barley, the latter being considered the best preparation for the succeeding crop of peas. It is also found on this class of soils in the Wolds that wheat is liable to "night-ripen" if it closely follows a barley-crop. Indeed, so much is this adverse influence of barley dreaded in this district, that on one Wold

farm of about 1000 acres, which we visited, not more than 16 acres of barley were sown this year; and on the Eastburn farm it cannot be regarded as a general crop, its place being taken by oats, except, as a rule, on one field every year.

Both barley and oats are mown with the scythe at a cost of about 10*s*. per acre, including sheafing, stooking, and raking, all these operations being found necessary in this northern climate. The only difference between the harvesting of these crops and wheat is that they are made into long stacks instead of round ones.

The quality of the barley grown is very good, and most of it is sold for malting.

4. *Seeds.*—The seeds are sown broadcast, about 35 lbs. to the acre, as soon as possible after the oats have been got in and the land Cambridge rolled, certainly before the spring corn is up, so that sowing is generally finished by the end of April.

The mixture of seeds used for the strong land is the following:—14 lbs. trefoil, 11½ lbs. White Dutch, 3½ lbs. red clover, 3½ lbs. plantain, and 2 lbs. parsley. On the lighter land, which consists of a very loose light gravel, the mixture consists of 14 lbs. trefoil, 14 lbs. White Dutch, 4½ lbs. plantain, and 2½ lbs. parsley. On some portions of the farm a certain proportion of Alsike has been tried in lieu of an equivalent quantity of White Dutch Clover.

Clover sickness is prevalent not only on this farm but all over the district, and hitherto the extension of the four-course system has been the only known antidote. The system adopted, though it may be termed a seven-course system, is really a four-course, in which barley, followed by peas, and afterwards turnips, is substituted for oats and seeds on a certain portion every year. This portion varies according to circumstances, but the deviation from the four-course system is not greater than they are compelled to make in consequence of clover-sickness.

The whole of the seeds are used for grazing purposes.

5. *Tares and Peas.*—For tares the barley-stubble is ploughed immediately after harvest, and from 10 to 12 pecks of tares are drilled to the acre at the same time. For peas the land is ploughed either late in the autumn or early in the spring; and late in February or early in March it is harrowed and drilled with about 4 bushels per acre of Early Dun Peas. No farmyard manure is used for these crops. As soon as the peas are well up they are hand-hoed once at 4*s*. per acre, and they are harvested generally before wheat, in July or early in August, at a cost of about 5*s*. per acre, exclusive of leading and stacking.

Tares are mown for the horses as soon as ready, which is generally early in June.

Artificial Manures and Oilcake.—The annual expenditure on linseed cake and other artificial food is about 1600*l.*; for fertilizing materials there are annually bought (1) dressing for 300 acres of roots, at, say, two guineas per acre, 630*l.*; and (2) top-dressing for corn on the gravelly light land about 200*l.*, making a total of 2430*l.* In addition to this a large quantity of lime (the Grimston or Knottingley being preferred) is annually used at a cost of about 10*s.* per ton, including leading.

Horses.

A rather light active description of cart-horse is employed, and a sufficient number of horses are bred on the farm to replace those which annually die off, or become unfit for their work; but horse-breeding as a source of profit has not been pursued. About 36 cart-horses are usually kept, and they are worked in pairs by yoking abreast, being also kept in pairs in the stables. The Wold carter is easily roused to eloquence on the subject of the mental and physical advantages of keeping two horses together.

In winter the fodder consists of chaff with 2 pecks of oats per day; and in the spring and autumn seed-times, and when the work is harder than usual, a small quantity of Indian meal or split beans is given in addition. During the summer less corn is given, but tares are allowed to the horses in the foldyards; and they are partially kept out on the pastures.

The manual labour connected with the horses is very methodically arranged. The 36 horses are equally divided between the Warren and the Eastburn homesteads, and the hind who lives at each place boards 6 lads who look after their 18 horses, the hind giving out the corn. These lads, during spring and summer, get up at half-past 4, and in winter at 5, do the horses, give them a little corn, and find employment in the stable until 20 minutes past 5; they then go to breakfast, which occupies half-an-hour, leaving 10 minutes to enable them to get into the fields by 6. At noon they come in with the horses and get their dinners, being out in the fields again at 1. Work continues from 1 until 6, when the horses are brought into the stable and done up, the lads leaving for supper at a quarter to 7; and at 8 they return to the stable to finish for the night.

Cattle.

The cattle are principally bought in as young short-horn steers, and kept from 9 to 12 months; but in addition a herd of about 20 pedigree cows and heifers are kept on the farm.

The calves are reared by hand in separate boxes, formed by dividing a stall into 6 compartments by partitions; new milk is allowed for about 3 weeks. In addition to the young beasts already mentioned as stocking the pastures, about 80 steers are fed during the winter in the foldyards. These foldyards are very large, and they are so arranged and used that the cattle are moved in rotation from one to the next in order, as those previously occupying the latter are sold off. The steers are fed in these yards with sliced turnips and an allowance of 7 lbs. of oilcake per day. No food is steamed or otherwise cooked. On the average about 80 steers are wintered in this manner; and, as a rule, 20 go off at Christmas, 20 in March, 20 in May, and 20 in June. As a large quantity of straw is grown, and none is sold, it becomes an object of great importance to convert the whole of it into manure. The practice at Eastburn is to leave this manure in the yards until the middle of July, when it is taken out and spread over the clover. On an adjoining farm, however, a different system is practised; a large quantity of the straw is there sold to publicans and others in Driffield, and stable-manure is brought back to the farm. What manure is made in the foldyards is there carted into the fields in January, while still long, and made into immense heaps, in which form it is left until wanted for use.

Sheep.

The flock consists of 500 Leicester breeding ewes, descended from Mr. Hall's, of Scorboro. The wethers are sold fat at 1 year old, and the ewes are kept. In addition to the permanent flock it is customary to buy about 300 hoggets in the autumn, which are put on turnips with artificial food, and sold in the spring as they become ready. All the sheep are shorn before they are sent to market, and they are sent alive to Wakefield and the West Riding. Some few which generally remain over are sold in the autumn.

The breeding ewes are given a small quantity of turnips on the grass during the day, just before lambing, and are brought at night into the foldyards, where they are fed, both before and after lambing, on chopped oats, linseed cake, and bran. They are lambed in the foldyards, and are afterwards taken on the grass, where they are again given a few turnips. The lambing season commences early in March and lasts about five weeks. The lambs are generally weaned about the middle of July upon grass freed from the ewes, getting a supply of linseed cake and bran,—the ewes being at this time on the seeds.

The sheep are usually put on rape in the early part of

September, and on turnips at Michaelmas. They are stocked when put to the ram, about the 12th of October, on rape or turnips, the tups used being pure Leicesters hired for the season of James Hall, Esq., of Scorboro. About 140 ewes, or rather more than one-fourth, are annually drafted. About Christmas the whole of the sheep are put on swedes, which they stock until the hoggs are sold off and the breeding ewes put on grass.

One man attends to 200 feeding hoggs and cuts for them, the sheep being folded with nets. The fleeces average 9 lbs. each for hoggs and 7 lbs. each for ewes. Shearing is done at 2*s.* 6*d.* per day, with meat and two pints of beer in addition.

Sheep-washing is done by the shepherd in a running stream at a cost of 3*s.* 4*d.* per 100. The lambs are usually dipped after weaning, the old sheep are either salved or hand-watered in the autumn, and the lambs are again dressed at the same time at a cost of about 25*s.* per 100, including labour.

Pigs.

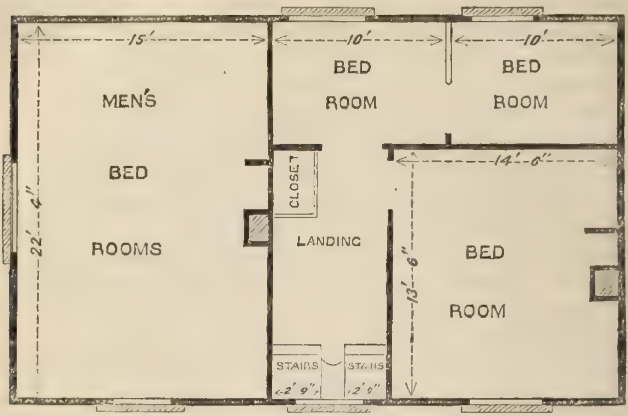
About 50 pigs are kept on the farm, living on waste materials, and, as some are sold, others are bought in to supply their places. The function of the pig here as in many other districts is simply to utilize what would otherwise be wasted.

Labour.

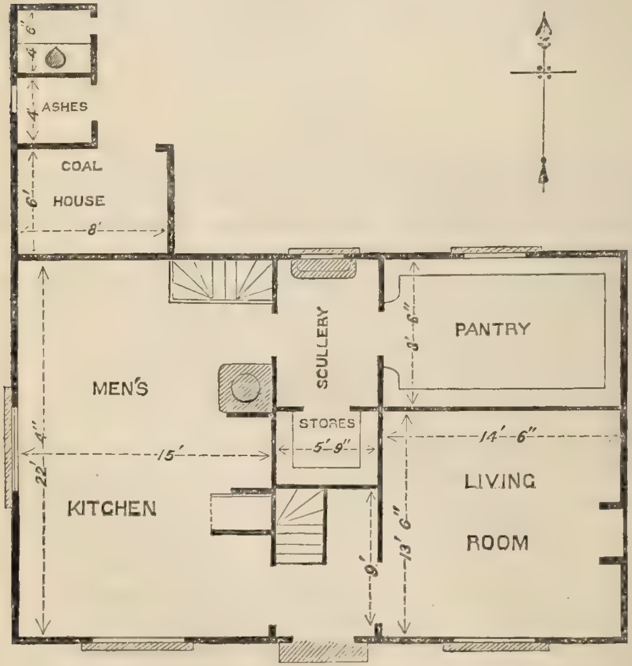
At each homestead is a hind's cottage constructed with reference to the system of employing and boarding a certain number of lads who are engaged by the year. These lads, of whom there are 7 at each farmstead, are hired at Martinmas, and are paid from 9*l.* to 18*l.* each per annum, according to their ability, length of service, &c., the average payment being about 13*l.* They live with the hind, who is paid by the occupier of the farm 8*s.* 6*d.* per week each for their board. The hinds get 17*s.* per week besides a cottage rent free, an allowance of potatoes for the household, and sundry perquisites for his wife's trouble.

The hind's cottages are designed specially with a view to prevent the hind and his family being inconvenienced by so many young men living in the house; and the annexed plans will show how admirably this has been arranged, the portion devoted to the hind and his family being almost entirely isolated from the living and sleeping rooms appropriated to the lads. The "men's kitchen," it will be seen, contains a staircase leading to the men's bedroom, which is not accessible from the main staircase; it also contains a copper, and is in direct connection with the washhouse and the pantry.

Fig. 2.—*Plans of a Hind's Cottage at Eastburn, illustrating the arrangement for boarding lads.*



Bedroom Floor.



Ground Floor.

The ordinary labourer's wages are 2*s.* 6*d.* per diem; but in harvest-time wages run as high as 18*s.* per week, with meat in addition. An allowance of 2 pints of beer per man is also given in harvest time and on threshing days; some of the labourers live on the farm, and others in neighbouring villages; but in either case it is a characteristic of them that they remain on the same farm from youth to old age. There are 4 good roomy labourers' cottages on the farm, each of which contains a parlour, kitchen, pantry, and outhouses on the ground floor, with 3 good bedrooms having separate entrances above, and to each is attached a garden about half a rood in extent. The rent charged to the farm-labourer for this accommodation is 1*s.* 3*d.* per week.

The average annual expenditure for labour, including harvest and turnip hoeing, is about 30*s.* per acre on the whole acreage of the farm, say 1300 acres.

Farm Buildings.

At Eastburn the buildings are better adapted for breeding purposes than those at the Warren, the foldyards being very much smaller. All the steading is built of brick, and roofed with slates, this being one of the many improvements carried out (in 1851) by the late Mr. Jordan. That gentleman also had a gas apparatus erected, and the carpenter (who is also joiner and wheelwright, and is employed entirely on the farm) makes a sufficient quantity of gas every day during the winter months to light all the farm buildings, including stables, cowhouses, &c., as well as the farmhouse. The Warren buildings were also erected when Mr. Jordan took the farm, and a belt of trees was planted on the north, east, and west sides of them, the situation being very much exposed. The whole of the north side of these buildings consists of a very lofty barn and granaries, which protect two large foldyards. These yards are shedded all round, the sheds having cribs beneath them. As the yards adjoin, the sheds down the centre are placed back to back; and here we find the turnip and cake houses, and other convenient offices. Stabling for 18 horses is provided on the outside of the eastern yard.

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3. *Aylesby, Riby, and Rothwell Farms, near Grimsby, Lincolnshire; in the occupation of* Mr. William Torr. By H. M. Jenkins.

Two of the farms now to be described have long held, either collectively or separately, a prominent position in the history of

British agriculture. Aylesby and Riby, like Skipworth and Torr, are names which will always be associated with advanced ideas of good farming and successful breeding.

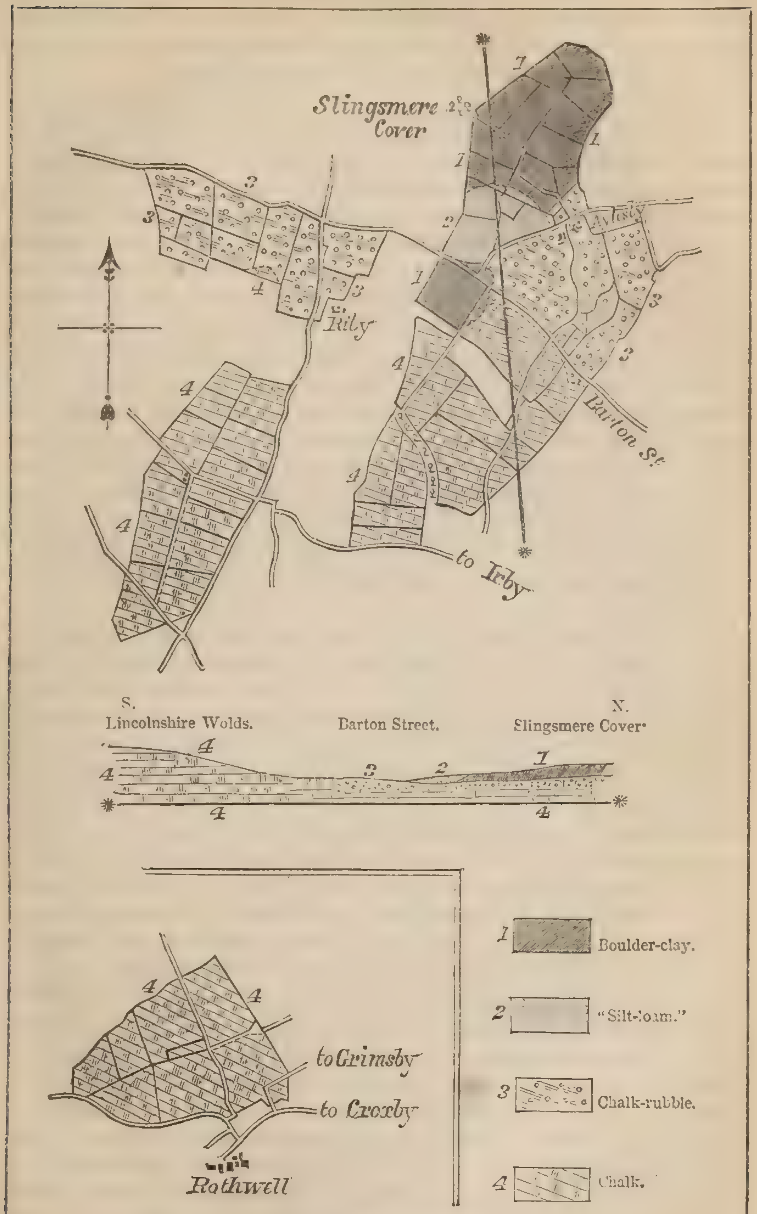
Aylesby was held successively by the two Skipworths, father and son, in the days of the Bakewell Ram Club, when Leicester sheep-breeding was a contest for giants. It consists of 940 acres, and is held under Mr. T. T. Drake, of Amersham, Bucks, at an annual rental on a Ladyday entry, with a very liberal tenant-right agreement, and no out-going crop.

The Riby farm has been in Mr. Torr's family for about a century and a half; it measures 720 acres, and is held under Col. Tomline, M.P. for Grimsby, at an annual rental, on a May-day entry, with an out-going crop. Rothwell consists of 420 acres, and, being a parsonage farm, is held under the present rector, who, it is almost unnecessary to say, has only a life-interest in it. Mr. Torr also occupies 200 acres of marsh-land, mostly his own property, at Immingham and Stallingborough, on the banks of the Humber. The whole of the land at present in Mr. Torr's occupation therefore measures 2280 acres. The proportions of grass and tillage are the following:—

	Tillage.	Grass.	Total.
Aylesby	700	240	940
Riby	610	110	720
Rothwell	404	16	420
Marsh-land ..	..	200	200
	1714	566	2280

Aylesby is about five miles west of Great Grimsby, and the village is situated just on the commencement of the chalky gravel or rubble which stretches as a kind of fringe along the foot of the Wolds. North of the village, as may be seen in the map, lies a mass of clay, which forms the subsoil of the great portion of the strong land on the farm; and there is an outlier of the same subsoil south of the road called Barton Street. This road may be taken as a very convenient, and it is certainly a very natural, line of division, to assist us in describing the physical features of the district. It runs along the line of a dry valley, and divides almost completely the strong land from the light, the only exception being the outlying patch of clay just mentioned. This clay is one of those glacial drift-deposits to which geologists now give the name of boulder-clay, but which in former days were known by various names, such as till, erratics, diluvium, and so forth. It is the same as that termed "plastic clay" by Mr. John Algernon Clarke in his prize essay on the 'Farming of Lincolnshire' in the 12th volume of this Journal. The section beneath the map of Aylesby and Riby shows the

Fig. 1.—*Geological Map of the Farms occupied by* Mr. Torr *at Aylesby, Riby, and Rothwell.*



Scale—One inch to the mile.

configuration of the surface on the Aylesby farm. The slope of the valley from Barton Street towards the clay-land on the north is seen to be very gradual, while on the south, after the intervention of a narrow plain of chalk, the surface rises somewhat abruptly and boldly to the true Lincolnshire Wolds.

Most of the gravel, or, as I prefer to call it, chalk-rubble, is covered with a good depth of from 2 to 4 feet of loam, which is simply a washing from the clay-land above. The other peculiarity to be noticed is the occurrence of a patch of "silt-loam" between the principal masses of clay and the outlier. This is very poor land, and owes its poverty to its geographical position having formerly contracted the mass of water which washed the loam from the clay, and thus, by increasing its velocity, prevented its depositing those coatings of "old warp" to which the rest of the chalk-rubble now owes its fertility. The clay portion of the Aylesby farm consists of about 300 acres in a dozen fields. It is a very cold subsoil, and has a covering of only 6 or 7 inches of loam; but it has recently been subsoiled by steam-cultivation. It is all thoroughly under-drained at a depth of 4 feet. The chalk portion, or Wold land, consists of 340 acres, and has a top soil consisting of from 12 to 18 inches of marly loam. The "chalk-rubble" and "silt loam" comprise about 300 acres, 210 of which, having the deep loamy soil just mentioned, are in permanent grass.

The Riby farm may be divided into two nearly equal portions, one of which (the Home Farm) runs for nearly two miles along the southern side of Barton Street. With the exception of a very small patch of chalk (marked 4 on the map) it consists entirely of the same "chalk-rubble" as that at Aylesby, is similarly covered with from 3 to 4 feet of strong fine loam, and is the best land farmed by Mr. Torr. The remaining portion, or the Riby Wold Farm, is a little larger than the Riby Home Farm, and consists entirely of chalk covered with about 18 inches of marly soil. It slopes to the east and south, and the harvest here is about a week earlier than at Rothwell, also a Wold farm, in consequence of its better aspect and lower elevation; but there is no artificial shelter to increase these natural advantagés.

At Rothwell the subsoil is also chalk, which is here covered with from 16 to 18 inches of a light marly loam. It is situated at the extreme height of the North Lincolnshire Wolds, and forms an elevated "hog's back." Formerly, and not many years ago, it was a rabbit-warren, and a warren sod-wall may even yet be seen, though it is in process of demolition by the present occupier. The only bit of pasture on this farm is a little field of 16 acres, situated, as may be seen on the map, where the road from the village of Rothwell branches, on the one

hand to Grimsby, and on the other to Croxby. It is used principally as a "city of refuge," a sanatorium, or such like. While describing this farm, it may be worth mentioning that it is divided into seven fields, exclusive of the small pasture. One of these is nearly 100 acres in extent, and the other six are worked in pairs (of one small and one large field), each pair making up about the same acreage. The four-field shift at Rothwell is therefore a very simple matter to arrange.

The only peculiarity of climate which it is necessary to mention is, that the north-east winds from the German Ocean in the spring very much retard spring-cultivation.

Fences.

Many of the fences are old quick-hedges, which have been mended and renovated by planting young quicksets to fill up gaps; but, after many years' experience, Mr. Torr considers it cheaper in the end, and every way better, to plant an entirely new fence than to patch up an old one. A large portion of the fences at Aylesby and Riby have been thus replanted, considerable care having been taken to insure the production of a close dwarf fence with a good bottom. The land is first trenched in the autumn $2\frac{1}{2}$ feet wide and 2 feet deep, and the trench is filled with either maiden earth or turnip-soil mixed with foldyard manure and a small quantity of chalk. This compost is turned over in the winter; and in February 3-year old quicksets are planted on the level, 3 to 4 in a yard;—only the oldest hedges are bordered by ditches, and these in most cases are small watercourses. The planting is done as day-work by the ordinary labourers employed on the farm. The quicks are allowed to grow freely for 3 or 4 years before they are slashed or cut; after that interval, *one side* is trimmed, in the autumn, in a slanting direction upwards and inwards, from the base towards the centre; when this side has recovered, grown into form, and become compact by the production of small branches and spurs,—a process which usually occupies from 3 to 4 years, —the other side is dealt with in the same manner. By these means a good compact growth is secured, and the hedge is never entirely denuded of its small branches. After the effects of the last operation have been overcome the fence is considered mature, and it is then trimmed annually as soon as the sap begins to fall —the trimmers generally commencing in September. The fence is trimmed to a pyramidal shape, about 4 feet at the base and $4\frac{1}{2}$ feet high, at the rate of *3d.* per chain for cutting both sides and cleaning the roots, which also is done every year with great care. A strong marling has been found very beneficial to old hedges, as it enables the soil to retain moisture.

Gates.—The gates are all alike, at Aylesby, Riby, and Rothwell. The pattern was designed and the mode of construction planned by Mr. Torr thirty years ago. At the Warwick meeting in 1859 Mr. Torr exhibited one of his gates to compete for the prize offered by the Local Committee for the best farm-gate, which he duly won, and the prize-gate itself may still be seen at Riby, looking very little the worse for wear after ten years' service. The gates are hung on oak-posts, and the fence is protected on each side by about 4 feet of paling; both posts and paling are tarred, but the gate is painted straw-colour, a new coat being given every year. Most of the gates are 10 feet wide, but where no large instruments pass through them they have of late years been reduced to 8 feet, and are then made to answer the purpose of handgates. They are all made on the farm.

As a really good farm-gate, combining strength and durability with cheapness and neatness, is by no means commonly seen, probably the following description and illustration will be thought worth the space they occupy.

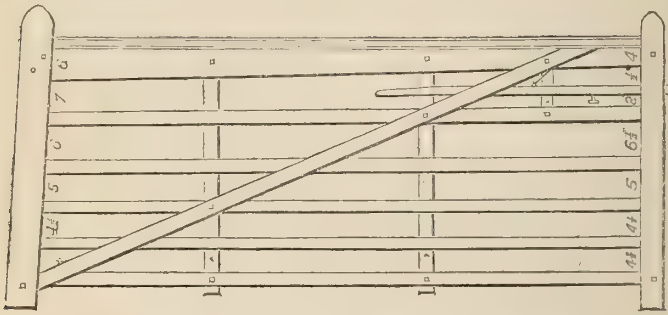


Fig. 2.—Warwick Prize Farm-gate, designed by Mr. William Torr.

The gate has six bars at unequal distances, from $4\frac{1}{2}$ inches apart below, to 7 inches between the two top ones. It is strengthened by a diagonal support-bar on one side of the bars, and by two upright ones on the other.

The bars are inserted into the heads without any tenoning, and the support-bars are bolted together and to the gate bars, as seen in the figure. There are three fixed points, on the security and strength of which depends the durability of the gate; these are where the top bar enters the heel, and where the diagonal support-bar is fixed to those two. The upright support-bars are of less consequence, being used chiefly to diminish the flexibility, and increase the rigidity, of the gate in a vertical direction.

The gate is ornamented by a flat cap, of the same size and thickness as a bar, but with the corners planed off, being placed flatwise upon the top bar. It is of some little use as a

shelter to the gate, and of more as affording an additional means of securing the diagonal support-bar.

The posts are of oak, and are trimmed to be a little wider at the bottom than at the top, so as to give a little heel-fall. This fall is modified by the crooks being inserted into the post a little obliquely, the lower one being about an inch the nearer to the opening gate. In consequence of the former arrangement, the gate is made about $1\frac{1}{2}$ inches wider at the bottom than at the top, the obliquity being in the heel. When shutting, the impetus should never be great enough to make the slam jerk the latch out of the socket.

The latches generally used are ordinary wooden balance-bar bolts, hung by a staple and hook. A screw is driven half-way in on the lower side for convenience of opening, especially when riding.

Drainage.

At Aylesby about 300 acres of tillage and 100 acres of grass have been thoroughly drained with 3-inch D-pipes, at a uniform depth of a little more than 4 feet, the rows being from 8 to 9 yards apart, and the outfall-pipes from $4\frac{1}{2}$ to $5\frac{1}{2}$ inches in diameter. No old ditch has ever been used as an outfall, but a system of Mr. Torr's invention has been substituted for the more general plan. About 20 feet within the fence a line of outfall-drains has been laid with $4\frac{1}{2}$-inch D-pipes; a double set, or even three rows, having been used side by side, in preference to larger pipes, where a more capacious outfall was considered necessary. These outfall-drains discharge into brickwork tanks sunk in the lowest part of the field, and covered with a wooden door. Small tanks of similar construction have also been placed at the angles of drains, and cap-tiles have been used at the junctions of ordinary with outfall-drains. The tank-mouths of the outfall-drains are set in the brickwork of the tanks, which discharge themselves into the main open drains of the estate. The great merit of this system is the complete control which is insured over the outfalls, and the facility of access to them.

The landlord supplied the pipes and other materials, and the tenant found the labour, on a four-years' purchase tenant-right agreement. On the tillage-land the draining has always been done upon seeds, a thin sod being placed round the tiles; and where economy of fall was necessary, as much as possible was reserved for the outfall drains, that being considered the great secret of successful draining. In proof of the correctness of this practice, we may state that it has not been necessary to take up a single yard of pipes.

Grass-land.

The permanent pasture consists of about 200 acres of marsh-land at Immingham and Stallingborough, 300 acres at Aylesby and Riby, and a small "sanatorium" of 16 acres at Rothwell. It is all old pasture, except about 60 or 70 acres at Riby. This was laid down after two successive crops of turnips, the land (a light gravelly loam) having been well limed previous to the first crop. The turnips were eaten off by sheep, and a seedsman's mixture of small seeds was sown the next year with barley. This new pasture has been much used for lambing-ewes, which have eaten on it a large quantity of mangolds, swedes, corn, and cake; and it is considered that the absence of mosses is to be attributed chiefly to this treatment.

Some portion of the old pasture is annually top-dressed in rotation with from five to six loads of compost per acre, mixed with foldyard manure; and frequently quantities of wheat-chaff from the threshing-machine are scattered over it. The marsh-land is chiefly used for grazing and feeding purposes, oilcake being frequently given on it. At Aylesby and Riby the pastures are stocked with the breeding flock. No horses are ever put on grass.

The permanent meadow-land is all old, and consists of from 40 to 50 acres; it is annually top-dressed with five or six loads of foldyard manure, or with compost, and it occasionally receives a dressing of guano, from 2 to 3 cwt. to the acre. Mowing and haymaking machines are used for getting in the crop; and the hay is put up in round ricks. All the hay is chopped before used.

Occasionally the mower is put over some portion of the pastures in June, so as to get better grass for lamb-keeping.

Arable-land.

The shift at Rothwell and Riby is the ordinary four-course system, with the exception that a small portion of the earliest fed-off turnip-land at Riby is sown with wheat instead of barley. At Riby barley is the only spring corn, while at Rothwell oats are usually grown. At Aylesby the Wold land is managed similarly to that at Riby; but the strong clay land, which has been drained and limed, is, as a rule, sown with wheat every alternate year.

The following tabular statement of the courses of cropping at the different farms will make the system intelligible at a glance:—

	Rothwell.	Riby.	Aylesby Wold.	Aylesby Clay.
1st year.	Wheat.	Wheat.	Wheat.	Wheat.
2nd „	Turnips.	Turnips.	Turnips.	Roots.
3rd „	Oats or barley.	Barley or wheat.	Barley or wheat.	Wheat.
4th „	Seeds.	Seeds.	Seeds.	Seeds or tares.

It will thus be seen that, out of 1714 acres of tillage, about 500 acres are annually devoted to wheat.

1. *Wheat.*—Except on the strong land at Aylesby, the seeds are always ploughed and pressed early, and the land is left thus until the end of September or the beginning of October. The strong-land seeds are generally broken up by the steam-cultivator at a cost of about 12*s.* an acre, and the land is afterwards ploughed and pressed. Any portion which seemed to require it would have a dressing of summer-made foldyard manure before ploughing; and another portion would probably be top-dressed with 2 cwt. of guano and 3 cwt. of salt early in the spring.

The seed, after having been dressed with arsenic, or preferably with blue vitriol, is drilled with an ordinary corn-drill, from 8 pecks on the strong land to 12 on the Wold land being used to the acre. Oxford Prize (a red wheat) is the kind usually sown. Sowing commences on the Wold land at the end of September, and finishes on the strong land in the last week in October, except on those portions of the farm where wheat succeeds early-fed turnips, as there it cannot be sown until the end of November or beginning of December. There also the seed is drilled with a two-row presser-drill, consisting merely of a common drill attached to an ordinary two-horse presser. Early sowing is regarded as of the greatest importance on the higher lands, as it enables the plant to resist the severe winter frosts of that climate so much better than it could otherwise do. Spring wheat is cultivated to a certain extent.

Early in the spring the land is Cambridge-rolled, and the strong land is well harrowed; a large portion of the light land is also gone over with lighter harrows; but hoeing is not much practised.

At the commencement of harvest a reaping-machine is used; and, after a certain portion has been thus cut, the remainder of the wheat and the whole of the spring corn are cut by the scythe. The wheat cut by the reaper is harvested as soon as possible, and every endeavour is afterwards made to keep the harvesters as close as possible to the scythe. The harvesting of the machine-cut wheat commences as soon as the scythe begins to be used to the remainder, and afterwards to the spring corn—harvesting and mowing proceeding together.

Wheat and barley are sheafed and stooked in the same manner as on the Wolds; and the former is made into round stacks, each of which contains about one day's work for a steam-threshing machine, or, on the average, from 40 to 50 quarters. The stacks are placed on raised steddles, which are nearly one foot in height, and are made of a concrete composed of a mixture of chalk and sand.

The prevailing system of payment is at a certain price per acre for the whole of the white crops on the farm, the prices for 1868 having been 10*s*. 6*d*. per acre for Aylesby, 9*s*. 6*d*. for Riby, and 8*s*. 6*d*. for Rothwell. These prices include mowing, sheafing, stooking, raking, &c.; in short, getting ready for the waggons. Threshing is done entirely under a hiring or letting system, the whole of the corn to be threshed being let out at a certain price per quarter all round, the man who takes the contract performing every operation except stacking the straw and carrying the corn into the barn. When an elevator is required the contractor finds it. The prices paid are 1*s*. 8*d*. per quarter for wheat, and 1*s*. 5*d*. for barley; but the whole of the white crops are generally taken at 1*s*. 6*d*. per quarter all round. Grinding is also done at the same price.

2. *Roots.*—Immediately after harvest, Glover's paring plough is extensively used on the stubbles, as the first operation in the preparation of the land for roots. The strong land stubbles are then broken up, in the autumn, by the steam-cultivator; the light land stubbles are ploughed, a two-horse iron grubber sometimes following the plough. On the land intended for swedes and mangolds half the manure, namely, five or six two-horse loads per acre, is put on during the winter, and the same quantity in the ridges at the time of sowing. Upon the stronger land for turnips about 3 cwts. per acre of guano is drilled in the open ridges upon the dung, and a smaller quantity than in other cases of superphosphate and ashes is drilled with the seed. On the lighter soils the principal artificial manure for swedes and common turnips is dissolved bones, which are drilled with the seed at the rate of about 4 cwts. to the acre.

The land for mangolds gets, as already stated, half a dressing of farmyard-manure; then from 3 to 4 cwts. of salt, mixed with 2 cwts. of guano and dissolved in water, are put on the ridges by the liquid-manure drill; afterwards from 3 to 4 cwts. of superphosphate is drilled with the seed; and, finally, the land receives the remainder of its quota of farmyard-manure. The latitude of Aylesby is so far north that it would be impossible to grow mangolds without a deal of encouragement being given them. Mr. Torr gives all his roots a heavy dressing of manure, as he does not, as a rule, manure seeds.

In the spring, cultivation is principally performed by strong Finlayson drags, and another portion of the stubbles is steam-cultivated. By these means the ordinary ploughing of fallows is very materially lessened, and, as a system, Mr. Torr much prefers dragging to ploughing in the spring.

The ridges having been rolled down, root-sowing commences in April with yellow globe mangolds, of which about 20 acres

are grown, 6 lbs. of seed being used to the acre. Following this, in May, about 120 acres of Skirving's swedes are sown, as well as some early rape; and about 20 acres of early white turnips (grey and tankard whites), about the same time, for early feeding-off by hoggs. From one-third to one-half of the land devoted to roots is thus sown by the end of May. Early in June hybrid turnips follow in succession, namely, brown and green top yellows; and the common white, green, and pink globes, in alternate double rows, close the season of turnip-sowing by Midsummer Day. The first week in July about 20 acres of late rape is sown, to be fed off by drape ewes. The quantity of seed used is about 3 lbs. per acre, of all kinds of turnips; and all roots are sown on ridges about 27 inches asunder.

As soon as weeds begin to appear a light two-knived horse-hoe of home-make is used, the common turnips being set out to ten inches apart, and the swedes to twelve. The rape is gone over with a hoe having two 4½-inch blades, which prevents its becoming too thick and getting mildew. The grubber is then extensively used (two or three times), finishing up with a strong iron one-horse implement. Hand-hoeing twice, and singling by a man and a boy, are afterwards done at the rate of 6*s.* per acre.

The rape sown in May is eaten off by the rams and lambs in July, and the July-sown rape is used for the drape ewes in November. If plentiful it is used for the breeding ewes when put to the ram, as it gives the certainty of a larger flock of lambs.

Towards the end of September the common turnips are begun to be fed off, and are generally finished before Christmas. All turnips are sliced by the Banbury cutter, and the original implement, which took the Royal Agricultural Society's prize at Oxford, may still be seen on the Riby Farm. The troughs are placed in the fold of the previous day, and the cutters are therefore outside the nets, not within. All kinds of roots are pulped for stock.

The sheep begin to go on swedes soon after Christmas, and the later portion, as soon as they begin to show any indication of running, are taken up and put in small pies on the land, a few being occasionally put in pies with mangolds. The sheep generally come off swedes about the middle of April.

The whole of the mangolds are carted off and put into pies, somewhat late in the season, as so far north it is very difficult to get them ripe enough to take up early. About one inch of the top and the whole of the fangs are left on the root, and neither straw nor thatching is then used in the pies, which are left open at intervals along the ridge, wisps of straw being used to stop up the apertures when required. Mangolds mixed with swedes are given to the stock, commencing in January and continued until

late in March, when they are given to the ewes in lambing-time, for which purpose they are very extensively used. After this they are pulped for cattle, and sliced with the turnip-cutter for ram-hoggs as late as July, or until the May-sown rape is ready for them.

Cabbages.—This crop has hitherto been grown principally for lambs in September, and for the lambing ewes in the spring, to be given with mangolds. Its cultivation is now being extended for earlier keeping and especially for lambs, about 15 acres being planted this year for summer eating, and about 10 acres for spring keep. The cabbages are partly raised from seed, but a large number of plants are also bought, as in the neighbourhood of Grimsby they are very cheap. The land has a heavy dressing of dung before the plants are pricked out; and the planter is attended by a boy who puts into each hole a small handful of old rotted bones.

The following is the scheme of cabbage cultivation which is at present pursued by Mr. Torr :—

I. Seed sown end of July or beginning of August :
 (*a*). Planted out in October, in succession.
  1. Wheeler's Imperial ; ready middle of June.
  2. Enfield Market ; ready end of June.
  3. Enfield Market ; ready beginning of July.
 (*b*). Planted out in March, in succession.
  4. Enfield Market or Late York (first week) ready middle of July.
  5. Sprotboro's (last week) ; ready middle of August.
 (*c*). Planted out in April.
  6. Drumheads (Scotch) ; ready in September.

II. Seed sown end of March or beginning of April :
 (*d*). Planted out end of June.
  7. Drumheads (Champions) ; ready in December.
 (*e*). Planted out middle or end of July.
  8. Drumheads ; ready in January.
  9. Thousand-headed Brocoli ; ready in March and April.

3. *Barley.*—After the roots have been fed off, the land is ploughed and then gone over with a Finlayson drag, afterwards harrowed, and drilled with 11 pecks of Chevalier barley to the acre, different varieties being used from time to time. Barley-sowing is generally finished by the middle of April, and the land is then Cambridge-rolled previous to putting in the seeds. Barley is grown in a very large proportion at Riby, a smaller quantity at Aylesby, its place being taken by wheat, and a still smaller quantity at Rothwell, being there replaced by oats.

Barley is mown with the scythe, sheafed, and stooked, and

carried to long stacks, the length of which is gradually increased as the crop comes in. These stacks have rounded or "cullis" ends, which are thus capable of being thatched, the gables being consequently avoided. In North Lincolnshire there is a great objection to gable or square-ended stacks. All the barley is sold for malting.

Oats.—As a rule the spring corn at Rothwell consists entirely of oats, which are consumed by the cart-horses on the different farms.

Oats are sown about the same time as barley; but, as they do not suffer so much as the latter from being sown either too late or too early, the period of sowing has a wider range. In other respects their cultivation is precisely the same as that of barley. About 4 bus. of black Tartarian oats are sown to the acre. The system of harvesting is also the same as already described above.

4. *Seeds.*—For summer grazing the following quantities, subject to slight variations, are sown per acre:—16 lbs. white Dutch, 6 lbs. trefoil, 2 lbs. plantain, 2 lbs. parsley, and on the higher land half-a-peck of rye-grass. At Rothwell more trefoil is sown, and less white Dutch, the high exposed chalk-land being considered less favourable for white Dutch clover than more sheltered and stronger soils. For mowing, 14 lbs. of red clover are sown with a quarter of a peck of rye-grass. About one-fourth of the seeds only are sown for mowing, so that red clover is not grown more than once in 16 years, and clover-sickness is not prevalent in consequence.

The seeds are drilled across barley, oats, or turnip-land wheat, the coulters being let down where the land has not been Cambridge-rolled. After sowing the land is lightly harrowed. No manure is put on the seeds, and occasionally tares are sown in place of them.

The red clover is mown with the scythe, the mowing-machine being very little used in consequence of flints and other stones being so abundant; otherwise it is treated and used exactly the same as the meadow-grass, and is similarly put through the chaff-cutter before being used.

Vetches.—From 12 to 14 pecks are sown early in the autumn on wheat-stubble, instead of seeds, with a little wheat or rye to hold up the crop. Most of them are got as soon as ready, and used for the cart-horses, after having been put through the chaff-cutter with a little straw; the remainder are folded off in succession by sheep during the spring and summer.

Beans and peas are not much grown, but occasionally beans are grown on the strong land at Aylesby instead of seeds, the drills being 26 inches apart.

Cattle.

The breeding herd consists of about 100 pure-bred Shorthorn females of all ages—namely, 40 cows put to the bull, 15 heifers put to at about 22 months old, and an average of about 45 yearling heifers and heifer-calves.

In winter they are kept in loose boxes, or are divided into small lots (from 6 to 8) in the foldyards. They live on chopped straw and pulped turnips, the heifers getting in addition a small allowance of oilcake, generally about 3 lbs. each per diem. In the summer they are kept on the pastures at Aylesby and Riby, until about three weeks or a month before calving, when they are taken into loose boxes, and put upon dry fodder, being given doses of Epsom salts and treacle twice a week. Independently of this special treatment it is the general practice on the farm to give the high-bred females half an ounce of saltpetre in a small bran mash once a week.

The bulls are kept in loose boxes, and get a liberal allowance of oilcake and meal, with pulped turnips in winter, and mangolds and bran in summer, a certain quantity of mangolds being reserved expressly for them. In addition to the weekly nitre-mash they occasionally have a gentle dose of Epsom salts and aloes. Nearly all the bulls are sold when young, generally as yearlings, more than 200 having been thus disposed of at an average of about 50*l.* each.

The calves are all reared by suckling, and, as many pure shorthorns are not allowed to rear their own offspring, nurse-cows are bought for the purpose. The calves are generally kept in loose boxes, and the nurses taken to them twice a day; some, however, are turned into the pastures, but the former plan is considered preferable.

Most of the male calves are kept for bulls, sixteen having been thus reared this year. These bulls are generally sold as yearlings, and very rarely let for hire. Those at present in service on the farm are "British Crown" (21,322), "Breastplate" (19,337), "Fitz-Royal," and "Governor-General,"—by "Commander-in-Chief," from Mr. Booth's "Bride of the Vale," which was recently sold for 1000 guineas to go to America.

The present herd dates back nearly thirty years, its foundation having been laid at Riby in the year 1840, when "Golden Beam," the ancestress of the celebrated G. tribe, was purchased from the Caedby herd. This cow, calved in 1831, was got by "Prince Comet" (1842), dam by "Count" (170). Since then seven or eight crosses of pure Booth blood have been implanted on this stock with successful results. The system of breeding commenced in 1840 with this tribe is simply to get a first-rate female of pure

descent belonging to any good family, and then to use pure Booth bulls. "Guitar," one of the representatives of the G. tribe was sent to Queensland last year; her pedigree included the following pure Booth bulls:—"Prince of Warlaby" (15,107), "Booth Royal" (15,673), "British Prince" (14,197), "Vanguard" (10,994), "Crown Prince" (10,087), "Vanguard" again, and "Baron Warlaby" (7813), as well as "Londesborough," 6142 (half Booth).

At Mr. Holdsworth's sale in 1841, "Flora of Farnsfield," got by "Rinaldo" (4949), out of the celebrated "Formosa," a descendant of Robert Colling's "Sweetbrier," was purchased as a member of the Barmpton herd, and became the progenitor of the "Flower" tribe. At the present moment, its representatives have four and five crosses of Booth blood; one of them, "Warlaby Flower," went to Canada last year, and recently "Faunist," a yearling bull, has been sold at a high figure.

The matron of the "Waterloo" family, "Water Witch," was calved in 1843, and bought in 1845, at the Rev. T. Cator's sale. She was from the Norfolk cow ("Waterloo 3rd"), that used to be so much less liked by her owner, at Kirklevington, than by his visitors; she is by "Fourth Duke of Northumberland" (3649), and is descended, through the "Waterloo cow," from the Waterloos in their best form. "Water Witch" produced to Mr. Torr seven females by Booth bulls; and at present there are no less than 40 to be seen at Aylesby. Although the first cross of Bates and Booth was not pleasing, there are now a large number of handsome animals belonging to this tribe in Mr. Torr's possession; but three fine specimens have been recently disposed of, to go to Canada.

The R. and B. family was next introduced, by the purchase of "Rennet" in 1853, and "Blanche 2nd," in 1851, both descendants of "Rose," bred by Mr. R. Booth, of Studley.

The Bracelet family, which was introduced by the purchase of "Sylphide" from Killerby, in 1852, has not been fortunate; and at present it has no female descendant left.

Next come the Ladies, or Sylphs, from "Lady Mary Bountiful," by "Baron Warlaby," out of "Lady Bountiful," and descended from Lord Spencer's celebrated cow, the "Woodford Sylph." "Lady Mary Bountiful" was bought in 1860; and "Lady of the Manor," of the same blood, by "Highflyer (11,576), out of "Lady Bountiful," six years previously. A member of this family, "Lady's Prize," is just going to Kingsfort, where many of her tribe have found a home for years past.

A specimen of the Telluria family, of Wiseton descent, "Telluria 2nd," by "Horatio" (10,335), out of "Taglioni," was added in 1862, with a view to perpetuate the fine type of the

celebrated Mason cows. Two females from her are now at Aylesby.

The last introduction into the herd, also made in 1862, was the Cherry family, by the purchase of "Cherry Duchess 3rd," got by "Second Grand Duke" (12,961), dam "Cherry Duchess 2nd," and descended direct from Colonel Cradock's "Old Cherry." This enabled, perhaps, as good an introduction as possible of the Booth blood to be made upon the Duchess and Cherry strains. "Old Cherry" was the dam of "Mussulman," the sire of Mr. Booth's "Buckingham," which was out of the celebrated "Bracelet;" while, on the other hand, all the bulls which have been used at Aylesby have come from Killerby and Warlaby, and possess a large amount of Buckingham blood. The Cherry and Duchess blood in their best forms are thus combined, and the progeny, of which about half-a-dozen females are now at Aylesby, take the name of "Cherry Queen."*

Feeding Beasts.—About forty three-year-old steers are grazed every year, getting an allowance of cake on the grass towards the end of summer. A similar number of two-year-olds and yearlings remain after these are gone off, and are similarly treated in succession.

The steers grazed as three-year-olds are allowed during the previous winter about 6 lbs. of oilcake per diem in the foldyards, with a moderate quantity of pulped turnips, straw, and chaff.

The two-year-olds have the same keep, with the exception that the allowance of oilcake is reduced to 4 lbs.; while the yearlings get only from $2\frac{1}{2}$ to 3 lbs. of cake, but a rather better chop.

About ten cows are fed off on grass every year, in addition to the nurse-cows, which swell the total to about sixteen or twenty per annum.

The steers and the young breeding-stock are, in winter, kept entirely in small foldyards with open sheds, the covered part occupying from one-fourth to one-third of the total area of the yard. The main principle kept in view in constructing and arranging these foldyards is that there shall be "no thoroughfare" from one to another, each yard being kept quite isolated from the rest. The sheds are cheaply built, on the north side of the yard, with a brick-wall at the back and a tiled span-roof, supported in front by larch props. Each of these yards will hold from eight to twelve head of cattle, and the sheds in some of them are easily converted into loose boxes, if required for breeding cows. The bulls and breeding cows are kept in loose boxes, of which there are a large number at Aylesby and a few at Riby.

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* "Cherry Queen 4th" obtained the second prize at Manchester, in the Yearling Heifer Class, and the first at the Lincolnshire Society's Show at Lincoln.

Sheep.

The flock consists of 1200 breeding ewes, of which 500 are pure Leicesters, kept entirely at Aylesby. No lean stock is sent to market, the whole of the lambs being fed on the farms, as well as some lean ones in addition, which are bought in the autumn to make up for losses, &c. At Riby the proportion of gimmers annually introduced into the flock is fully one-third; but at Aylesby it is less, as fine breeding ewes are kept on to an indefinite age. The crop of lambs is about 10 per cent. in excess of the number of ewes put to the ram.

The sheep are all taken off turnips and swedes by about the middle of April, when the hoggs, except the smaller "she-hoggets," are sent to the marshes. The latter are fed at Aylesby and Riby, after the breeding ewes; but these are put on the pastures earlier, about a fortnight or three weeks previous to lambing, and have an allowance of mangolds carted to them daily. The ewes and lambs are kept on seeds, which are entirely stocked by them, and on the grass lands at Aylesby and Riby, the ewes with couples having an allowance of oats and peas. The draft ewes from the lamb-pens are sent to the marshes. A system of changing the pasture of the sheep is carried out as far as practicable, and is regarded by Mr. Torr as one of the most essential points in good sheep-farming. Early in July the lambs are weaned on May-sown rape and clover-eddishes.

The hoggets are put on turnips in September, the Banbury cutter being kept fully employed in cutting the roots outside the nets. The troughs are placed in the fold, which was more or less cleared the previous day, and a small quantity of oilcake is allowed per head. The shearling ewes are put on turnips next, and before the older ones, which get a smaller allowance and begin later. The draft-ewes which still remain begin to feed off the July-sown rape early in November, clearing it, and being all sent to market before Christmas day.

During the winter months the sheep are killed at home, and the carcasses are sent to the London market in baskets; but in the summer they are sent to market alive, chiefly to London.

The majority of the breeding ewes of the Riby flock are placed in the marshes with the rams after the feeding sheep are gone, and remain there nearly until Christmas. They then return to Riby and are put on turnips, as already stated. The remainder of the Riby breeding ewes and the whole of the pure Leicesters are put to the ram on the grass lands of Riby and Aylesby re-respectively, and remain on them until very late in the season.

From 80 to 90 pure Leicester rams are annually bred at Aylesby, and are annually let by private contract on the first

Wednesday in September, with the exception of those required for the farm itself. Until then they are kept on the fat of the land, namely, red clover, May-sown rape, cabbages, mangolds, corn, and cake.

Eighty years ago the foundation of this famous flock was laid by Philip Skipworth, the elder, by the purchase of Dishley ewes. At the death of this worthy the flock and farm of Aylesby passed to his son, whose name and reputation were identical with those of his father. The tups used by these breeders of the olden time were hired from the Bakewell Ram Club, whose rules, regulations, and proceedings have already been described by Mr. Dixon in this Journal.* That Society offered 300 guineas for the use of "Aylesby A," to the elder Philip; and as much as 600 guineas has been paid for the use of a Leicestershire ram at Aylesby. Tups were also largely used in succession from the flocks of Stubbins, Honeyman, and Buckley, as well as from those of the three Stones and the two Burgesses.

In 1848 Mr. Torr succeeded the younger Philip in the occupation of Aylesby, and bought the pure Leicestershire flock of 400 ewes for 1500*l.* Since then the tups used have been almost entirely hired from Burgess and Sanday; one or two others, however, have been obtained from Buckley and Stone. All the new blood has, therefore, been obtained from the purest flocks of Leicestershire and Nottinghamshire.

The present flock does not possess quite so much elegance of form as characterized it during the reign of the two Philips; but a great improvement has been made in the weight of the wool, size of the sheep, and hardihood of their constitution. This result has been attained solely and entirely by successful selection, strictly influenced by absolute attention to these points only, at the sacrifice of those which were formerly deemed necessarily characteristic of the pure Leicester breed. The careful breeding of twenty years has been occupied in achieving this result; but it may be carried onwards, or turned into any given direction, provided that sufficient time and care be devoted to the pursuit.

The letting-books of the last 20 years show how much, and how widely, Aylesby blood is appreciated. A very large number of rams have gone to Ireland, some to France, Australia, and California, and a few even to Jamaica and St. Helena; while near at home Mr. Torr numbers amongst his enstomers residents in Scotland, Wales, and most of the English counties.

From 2400 to 2500 sheep are annually taken to the clipping-boards, about one-half of them being hoggets. The whole of the sheep on the farm are washed at the same time,—about seven days

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* 'Journ. Roy. Agricultural Soc.' Second Series. Vol. iv. p. 340.

before clipping. The system of washing is somewhat elaborate. A tub is placed in a foldyard and about half sunk in manure to get its rim at a convenient height; it is then filled with water at the rate of three gallons to every sheep to be washed in it,—four gallons for every ten sheep (or nearly half a gallon per sheep) being hot water in which has previously been dissolved a certain quantity of soft soap, the quantity used being about 1 lb. of soft soap for every score of sheep. Five men are employed at the tub, namely, two at each side and one at the end, two more having their time fully taken up in catching the sheep and boiling the water. If the work is properly done, at least one score of sheep can be washed per hour, and the total cost, when carefully calculated, seems to be 1*d.* per sheep, including soap, the price of which is 5*d.* per lb. The advantages claimed for this system are that the ewes are not long from the lambs, and that much wool is saved, especially from broken fleeces; then the water having been rendered nearly tepid, the sheep do not chill as they do when washed in a pond. After washing, the sheep are turned into a foldyard, and there stroll about until taken back to the pastures. The expense of washing at the ponds is calculated to be about one-third less than by this system; but the advantages of the latter are more than sufficient to counterbalance the additional cost. Originally this system was applied only to the fat sheep; but it is now used for the whole of the flock.

The sheep are shorn by a company of clippers, consisting of ten men, who travel from farm to farm. The price of clipping is 3*s.* per score, no beer or any other allowance being given in addition. Clipping from twenty-five to thirty sheep is considered to make a day's work per man. Docking lambs is done by the same people at 3*d.* per score. The whole of the sheep are clipped at Riby, and the operation gives six days' full work to ten men, 1800 sheep being clipped, or thirty sheep per man per day. The work is done at two periods, namely, June 2nd, 3rd, and 4th, for the first half, and June 8th, 9th, and 10th, for the second. The six or seven hundred remaining sheep, making up the usual 2400 or 2500, are clipped previously, as they are killed for the London market. Wool-winding is done at 4*d.* per score fleeces. The fleeces of the Aylesby flock average about 7 lbs. each, and those of the rest about 9 lbs., or nearly three to the tod.

The lambs are dipped at the end of June or beginning of July, as soon as they are taken from the ewes, by a travelling dipper, at a contract price of 1*s.* 6*d.* per score; and the clipped sheep are washed at 6*d.* per score.

The hoggs in the marshes are dipped in July, in accordance with the old plan, namely, 1 lb. arsenic and 2 lbs. soft soap, dissolved in 20 gallons of water. After Christmas the lambs and

hoggs are dipped with the same wash as in summer, or are dressed with sheep-salve; but the ewes are neither dipped nor dressed at this time of year.

Pigs.

A few breeding sows of a small white breed are kept; and store-pigs, as required, are bought for the stubbles and foldyards. About thirty pigs are fed annually for home consumption, chiefly for the foremen who lodge the yearly servants. The food consists of boiled potatoes, with either barleymeal or peameal, generally commencing with the former and finishing with the latter. The average weight obtained is 25 stones. None are sold. Although Mr. Torr does not keep pigs as a source of profit, he some years ago thought enough about them to invent a pig-trough, which was patented by Messrs. Crosskill, and is well known and extensively used all over England.

Cart-horses.

At Rothwell eleven horses are kept to work 400 acres of tillage-land, at Riby nineteen horses to work 610 acres, and at Aylesby twenty-two horses to work 700 acres; making an average of about three horses to every hundred acres of tillage. They are a light active description of cart-horse—the strongest animals being kept at Aylesby, where the land is heaviest, and the worst at Rothwell, where the soil is very light.

Horses are never turned out on the pastures, but in summer they are kept in the foldyards which are used by the cattle in winter; they are fed on tares, chopped up with oat straw by the chaff-cutter, and an allowance of 2 bushels of ground corn per week. Each horse also has 1 lb. of oilcake per day; this is dissolved in the water-cans, and is used in that state to moisten the chopped food; and whatever other alterations are made in the food at different times and seasons, the same quantity of oilcake is always given, and in the same manner.

The corn in summer is crushed oats or barley, mixed with ground peas or ground Indian corn; but in some years it has consisted principally of sprouted barley, at the rate of 1 peck of ordinary barley per day (making $1\frac{1}{2}$ peck when sprouted).

During the winter the horses are kept in stables, standing in pairs in 9-feet stalls, which are furnished with mangers, but no racks. They are fed upon chaff and the same quantity of corn as in summer, the only difference being that a larger proportion of oats is given. The chaff consists of one-fourth clover hay and three-fourths straw; it is moistened with dissolved cake, as already described.

The horses are generally bought for use on the farm as two-

year-old colts, to fill up gaps, and they are kept until worn out. They are never bred, nor are they bought as a source of profit.

The ventilation of the stables is accomplished by means of double ridge-boards in the roof, the ordinary ridge-tiles being raised by means of blocks, thus allowing of a complete and equable ventilation all over the stable, and without any draught.

The stalls are separated by solid divisions, and the mangers are built of brick, with 2-inch tile bottoms, which are narrowed by the sides sloping internally. The front of the manger is a 3-inch deal, with an oak cap. The stalls are furnished with a standing post, at a convenient place for the halter-rings, and the mangers are divided in the middle, so that each horse has its own feeding-ground. No racks are ever used.

The horses are yoked in pairs, and always abreast, except in carting—the same pair of horses being worked together, if possible, in every operation, and also stabled together all the year round.

Single horses are not worked; the carts are all pair-horse, and ploughing, harrowing, and drilling are all done by a pair of horses. The drags are worked with either one or two pairs.

Pair-horse waggons are used for general purposes, and corn is delivered in pair-horse spring waggons of Mr. Torr's own design and construction. This waggon has a large turn-table, and both fore and hind wheels are placed well forward; it will, therefore, turn on its own ground. It has low sides and a large floor, rather high from the ground, as the fore wheels, in turning, go completely beneath the bed of the waggon to any angle. It is designed for the delivery of 10 quarters of corn by two horses.

The first waggon of this description, which may still be seen on the Riby farm, gained the 20*l.* prize offered by the North Lincolnshire Agricultural Society, at its show at Gainsborough in the year 1845.

The number of horses has not been lessened by steam cultivation so much as was expected; but much more heavy work is done on the farm by the same number of horses as formerly employed.

Farmyard Manure.

The manure made in the foldyards in the autumn and winter, up to the beginning of February (Candlemas), is carted out and used for the root crops, being put in the ridges as already described. That made from Candlemas and during the summer, by the cart-horses and a large number of cattle in boxes and foldyards, is partly used for such portions of the wheat crop as may require it, and the remainder is used in the autumn culture for the root crop, being carted out (except the stable manure)

and made into heaps in the usual manner, and a good deal of salt has sometimes been mixed with it. As a rule, from 6 to 8 two-horse cartloads is the usual dressing for common turnips, and from 10 to 12 for swedes and mangolds.

Artificial Manures.

These consist chiefly of guano, superphosphate, and salt, and cost annually about 1300*l.* The cake-bill is also nearly as heavy, the average consumption being 100 tons per annum.

The Wold land was marled from 40 to 60 years ago, and is now being thoroughly invigorated by that means. The system of marling now adopted by Mr. Torr is essentially different from that usually practised. The pits are very numerous, and the chalk is distributed about the land by means of barrows and planks, instead of horses and carts, and is afterwards spread over as usual. The cost is 7*d.* per cubic yard, and 80 cubic yards per acre is considered a good dressing.

Labour.

The labour account of a farm measuring nearly 2300 acres is necessarily a very heavy item in the expenditure, although between 500 and 600 acres are in permanent pasture and meadow. Mr. Torr estimated it roughly at about 60*l.* per week; and on carefully going through his accounts I found that it never falls below 3000*l.* per annum. This seems a large sum for the number of acres under tillage, and I therefore analysed the accounts for the several farms, with a view of ascertaining the cause of so great an expenditure. The tillage-land at Rothwell and Riby does not cost more than 30*s.* per acre per annum, the whole of the additional money being spent at Aylesby. This might have been, to a certain extent, inferred from the fact that a large proportion of that farm consists of strong clay land, and that what appears on our map as chalk rubble is overlain by a thickness of 2 or 3 feet of tenacious loam, which makes it also very heavy to work. But beyond these facts there is also the very important one that at Aylesby are kept the valuable breeding herd of pure Shorthorns, and the scarcely less valuable flock of pure Leicesters. The large cost of making implements, as well as the wages of the ordinary carpenter and blacksmith, also come into the Aylesby account, which, if deducted, would leave the cost of tillage about 35*s.* per acre.

The wages given are very good, and generally comparable with those ruling on the Yorkshire Wolds. The ordinary labourer gets from 13*s.* 6*d.* to 15*s.* per week in money (according to the season, and the price of wheat), and he has the privilege of cropping a plot of potato-ground in one of the fields. The superior

men are paid equally well in proportion, a part of their emolument, however, being a good cottage, rent free, which may be valued at 2*s.* per week, according to the standard rent for such houses in the neighbourhood. At Aylesby there are 10 of these cottages, which are let with the farm. These are occupied by the Aylesby foremen (two), the head shepherd, head waggoner, groom, two yardmen, carpenter, and two labourers. Some of these cottages, and some at Riby, have been rebuilt by Mr. Torr, at his own expense, by a process which he modestly terms "moving them," and which involves not only a change but a considerable improvement in materials, accommodation, and site. Those at Aylesby have acquired a great reputation since the visit of Prince Napoleon in 1862, as his Imperial Highness was so struck with their many excellent points, that he took away with him plans and elevations, copies of which we reproduce on the following pages.

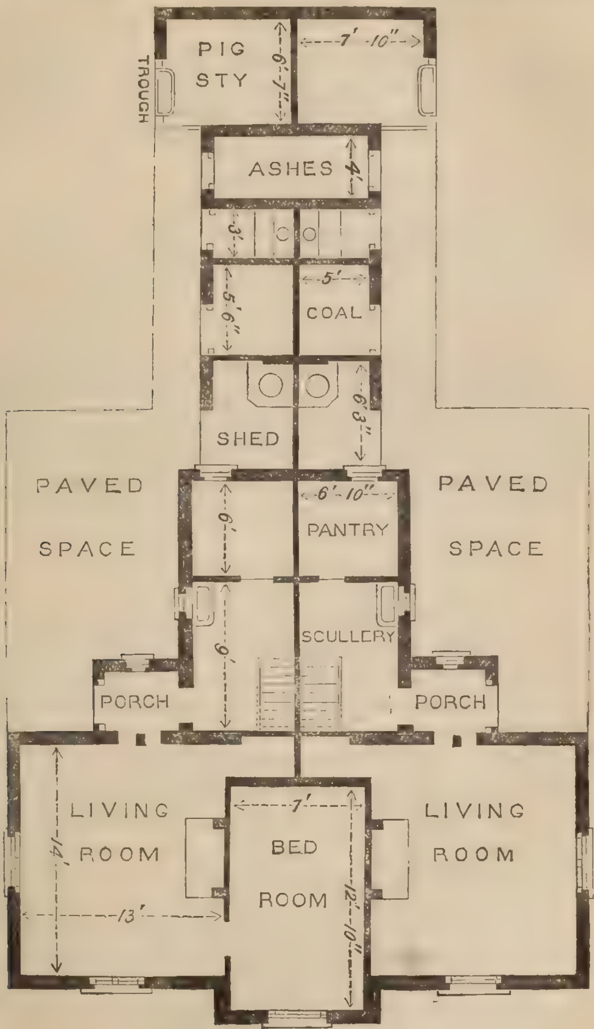
THE following STATEMENT of the WAGES earned by the principal MEN employed by MR. TORR will be more intelligible than any verbal description.

	£.	s.	d.	£.	s.	d.	£.	s.	d.
Foreman, Aylesby:—									
One year's wages in money				39	0	0			
Cottage and garden, &c., value				5	0	0			
Other privileges: Malt	2	10	0						
Pig	1	0	0						
				3	10	0			
							47	10	0
Foreman, Riby:—									
One year's wages in money				32	0	0			
Cottage and garden, &c., value				5	0	0			
Other privileges: Malt	2	10	0						
Pig	1	0	0						
Poultry rearing	1	10	0						
				5	0	0			
							42	0	0
Foreman, Rothwell:—									
One year's wages in money				32	0	0			
Cottage and garden, &c., value				5	0	0			
Other privileges: Malt	2	10	0						
Pig	1	0	0						
Poultry rearing	1	10	0						
				5	0	0			
							42	0	0
Shepherd, Aylesby:—									
One year's wages in money				26	0	0			
Cottage and garden, &c., value				5	0	0			
Cow				8	0	0			
Other privileges				2	0	0			
							41	0	0
Shepherd, Riby:—									
One year's wages in money				22	0	0			
Cottage and garden, &c., value				5	0	0			
Cow				8	0	0			
Other privileges				2	0	0			
							37	0	0

Fig. 3.—*Front Elevation of a pair of Labourers' Cottages at Aylesby.*

Fig. 4.—*Plan of Bedroom Floor of Labourers' Cottages at Aylesby.*

Fig. 5.—*Ground-plan of a pair of Labourers' Cottages at Aylesby.*



	£ s. d.	£ s. d.
Carpenter, Aylesby :—		
One year's wages, at 3*s.* 6*d.* a day	54 12 0	
Extra, 1*s.* per week	2 12 0	
		57 4 0
Waggoner, Aylesby :—		
One year's wages in money	32 0 0	
Cottage and garden, value	5 0 0	
		37 0 0

The foremen board about 13 youths, who are engaged by the year at May-day, at wages averaging 12*l.* each, and for whose board the foremen are paid as follows for each lad per annum :—

	£. s. d.
Money	10 0 0
20 stone bacon, valued at 6*s.* per stone	6 0 0
½ cow	4 0 0
6 pecks malt, at 8*s.* per bushel	0 12 0
Pig in foldyard, valued at	1 0 0
Potato-ground, valued at	0 8 0
	22 0 0

It may be considered worthy of remark, that no labourer, however aged or infirm, who has been in constant work on either of the farms, has ever been sent to a Union. However, the poor-rate comes to 1*s.* 10½*d.* at Aylesby, and 1*s.* 10*d.* at Riby, the total rates at the former parish being 3*s.* 10½*d.* per acre, and 2*s.* 9*d.* per acre at Riby.

Steam Cultivation.

Very little need be said under this head, as the system pursued by Mr. Torr, and the results attained, with all other details, have already been fully described in this Journal by Mr. J. A. Clarke, on behalf of one of the Committees on Steam Cultivation appointed by the Council in 1866. It will therefore be sufficient to mention that it has hitherto been done entirely by hiring, a system which is held in great favour by Mr. Torr, and is adopted by him for both threshing and grinding, as well as ploughing and cultivating.

The cost of breaking up seeds or strong land stubble the first time is 12*s.* per acre; if required a second time, it is done for 9*s.* per acre. Fowler's double set is used, and the arrangements as to time have hitherto been made without difficulty. No great saving in the number of horses employed has yet been made by the use of steam-ploughs. As to the effect of steam cultivation on different crops, Mr. Torr is strongly of opinion that it is most beneficial to root-crops, but he does not consider it so well adapted as some do to the preparation of land for wheat.

Previous to the introduction of steam cultivation, Mr. Torr

extensively adopted a system of subsoil ploughing, the subsoil following the ordinary plough, and thus obtaining a similar result, but at a very great cost, sometimes as much as 35*s.* per acre.

The old barns are now used exclusively for cutting straw into chaff, and as a receptacle for other fodder, the whole of the grain being threshed as just stated, and corn-houses provided for it, and for preparing it for market. The same people who do the threshing also crush and grind the corn for feeding purposes, by a portable crusher, which is worked by the steam-engine which drives the threshing-machine, and at the same time.

Mechanical Work.

As a head-carpenter and an under-carpenter are kept on the farms, and a blacksmith is employed at Aylesby three days a week, it is necessary to glance at their work under a special heading.

The carpenters make all the farm-gates, on the pattern already described, and not a few are made for sale to Mr. Torr's personal friends; but he does not profess to keep a gate-manufactory. The carpenters also do wheelwrights' repairing work, and they make all the carts and most of the waggons employed on the farms. Sometimes, one or two of the spring-waggons already noticed may be made for one of Mr. Torr's distinguished friends, but this is not often done.

There is a blacksmith's shop at Aylesby, where all the shoeing for that farm and all repairs are done, and most of the iron work for machinery is made, by the blacksmith who comes on daily wages three days every week. All the horse-hoes, light harrows, grubbers, and many minor implements, are home-made.

At Riby the horses are shod at a contract price per annum.

Farm Accounts.

Great pains are taken with the accounts of the different farms. Mr. Torr is not content with a balance-sheet at the end of the year showing the general result of the year's operations, but he insists upon knowing the effect of each particular farm on the general exchequer. To get at this result, Rothwell farm sells oats to Riby or to Aylesby, and so forth, in the same manner as if they were farmed by different men.

The labourers' accounts are kept in small books, one of which is devoted to each man; they are posted fortnightly into temporary sheet-ledgers, and the balances are ascertained every quarter and paid; the accounts are then posted in detail into the labourers' cashbook and ledger, and as a total into the labour account in the farm ledger. It will thus be seen that the men

are not paid exactly what is due to them every week. The system is to pay them fortnightly, Aylesby one week and Riby and Rothwell the next, a little less than is coming to them; and at the end of the quarter the accounts are made up,—the labourers being debited with the cash they have received, and the corn, mutton, &c., which they have bought (below market price),—and the balance is paid over to them. The remainder of the bookkeeping is done on an ordinary double-entry system.

In making up the account of profit and loss, great care is taken to allow for the depreciation in value of horses, implements, &c. Horses are credited to profit and loss at the prices paid for them, and a depreciation-charge of 15 per cent. on these amounts is placed on the debit side of the account every year. The depreciation charge on implements is calculated at 20 per cent. annually.

The general tenant-right agreement of the district, with respect to bones and other artificial manures, is that the outgoing tenant receives one-half of the last year's expenditure, and one-third that of the year before; and with respect to oilcake he gets one-half of one year's expenditure calculated on the average of the last three years. He is also allowed the whole amount of his new seed bill; and the cost of the labour upon all crops left on the farm, besides the cost of working the winter fallows. Liming is usually done by the tenant under a 4 years' tenant-right agreement, and marling under a 7 years. Mr. Torr's landlord at Aylesby allows him a more liberal tenant-right than that usual in the district.

4. *Nottinghamshire Farming.*—I. *South Nottingham: Hexgrave and Leyfields, in the occupation of* Mr. THOMAS PARKINSON. By HENRY HALL DIXON.

Hexgrave, where Mr. Parkinson resides, is about four miles as the crow flies, through Rufford Park, from Leyfields. He holds its 740 acres under his brother, Mr. Richard Milward, along with 360 more in Farnsfield parish. Hexgrave was originally granted to the Archbishop of York, when he lived at Southwell, in order to keep a few deer. The soil is half clay and half sand, and so variable that both may be found in the same field. Some of the sand-land is worth as much as the clay, and they are valued one with another at about 30*s.* an acre, but part of it is very near the gravel and requres a large quantity of manure, and then only gives a good crop in a damp summer. There is also some black peat bog, which is of poor quality and is soon burnt up in hot weather, and the grass has

not much goodness in it, if it be late in the season. They are more certain of good barley on the sand land, and five years out of six it makes a finer description of malt. The barley is sent to Fiskerton, Mansfield, and Newark, and the best of it is generally sold in the shape of malt to Burton. There are 200 acres of old grass, which have been laid down some years, but the grass land is not equal to that at Leyfields. The fields are generally from 12 to 25 acres, and one or two range from 50 to 70, "down-fall land." They have not needed much draining, but some of the strongest fields have been furrow-drained at the depth of 2 or 3 feet. There is no lack of water, which comes under the forest from Derbyshire, and is so soft that nitrate of silver will not turn colour in it. The quicks grow well even on the sand if they get a good start, and are protected for one or two years with brush thorns after planting.

The previous owner and occupier put five quarters of bones on every acre at Hexgrave as they became fallows, and the effect was visible for 20 years. The grass land is now dressed with half-inch bones and dust, three quarters to the acre, or 6 or 7 loads of common manure spread direct from the heap. One load put on as soon as the crop is taken produces more effect than two in winter. Much of the grass land is simply dressed by knocking about the manure left on it with the fork. More than 10 acres of grass are very seldom hained for hay, but they rely on red-clover, and generally win about 50 acres a year, and have also a few vetches for the horses in May and June. They never grow rape, as all the land in course is wanted for turnips. The mowers begin with their scythes about Waterloo-day, and the haymaking is generally over by Mansfield fair, July 10th. From 3*s.* to 4*s.* 6*d.* an acre is paid for cutting grass and clover, and the hay is all made by hand. The regular labourers do the mowing both of the hay and the white crops, and the harvest is got in by Irish or Derbyshire men, who are littered down on straw in the barn or corn chamber. The bulk falls under the scythe, but this year Hornsby's and Bamlett's reapers were used with success. Mowers are paid at the rate of 7*s.* 6*d.* to 10*s.* an acre for wheat, and more if the crop is heavy, 8*s.* to 9*s.* or 10*s.* for barley, and 7*s.* or 8*s.* for oats.

The regular men get 10*s.* for coal money, during harvest, and with allowance for supper and over-hours a man will earn about 5*l.* in three weeks, and sometimes more with the help of his wife and children. At Leyfields the beer is given through the bailiff, whereas at Hexgrave 5 bushels of malt (four for the year and one for harvest) are allowed annually, and the labourers brew at home.

Wheat and oats principally are the first crop on the sand

land. They plough up the ley 6 inches on this formation, and, as the soil is very thin upon the light land it does not answer to bury the turf too deeply. They look to get clean fallows immediately after the harvest, and have the heavy clay land sown by October 15th, and the rest within the month. On the clay land wheat is generally sown after beans and oats. The land is ploughed and then scuffled and cleaned, and then ploughed 8 inches deep for fallows. It is not the practice to sow spring wheat, and the autumn seed is steeped in a solution of sulphate of copper. Seven pecks per acre for wheat, 12 for barley, and 16 for oats is the general sowing allowance. Labourers do not seem to have the hand for the broadcast swing which they had formerly, and therefore it is always drilled in at 6 inches, which is not too narrow, as it is not followed by the horse-hoe. The sheep are not run as a rule over the wheat after January, and it is rolled in the spring when the land will bear horses. In a wet summer the sand land preserves a standing-up crop, whereas in a dry the clay does best. The clay carries most straw, but in a wet summer they get as much barley straw on sand land as on the clay. In ordinary seasons the crop of straw on the clay land, as compared with the sand, is very much larger, and they generally calculate on 2 tons of wheat straw. The most is obtained from the Essex Rough Chaff. Sheriff's wheat straw is so fine below the head, that it will not bear a large produce.

They do not plough deep for barley, and always make it a point to plough it dry and sow it dry. If sown wet, it is very rarely a good crop. As a general rule the barley cannot go in too dry, while wheat ought to be put in moderately wet. The Chevalier barley should be sown if possible in March or sooner. They drill in 12 pecks, and generally grow about 5 quarters per acre.

The land in course for turnips is manured at the latter end of the year, and the dung ploughed in where practicable. It is not touched again except in dry weather and then with light barrows before sowing time. If there is plenty of manure no phosphate is used. Sometimes guano has been substituted for the latter with three quarters of half-inch bones to the acre and a half-dressing (10 loads) of manure. So far only a few ox cabbages have been grown. Three-fourths of the turnips are swedes, which are sown during the last fortnight in May on clay land and up to June 7th on the sand. Thirty tons of them have been grown per acre on the clay land. The white are eaten by sheep on the sand land, and 20 tons are thought a good crop. The swedes are drawn and pulped for cattle all the winter and mixed with chaff. Mangolds did remarkably well last year, and so did the swedes until

the middle of August, when they were bit with *Aphis vastator* and went back so completely that they had to be resown. The beans (their best preparation for wheat) are only taken off the clay land, and are always sown 18 inches apart so as to get in the horse-hoe.

The old grass land is eaten with bullocks or drape beasts; they lie out until October and then the younger store beasts and sheep go on. Beasts that have been on the seeds, if there is plenty of straw, are brought into the yards not later than November, but even then they are out a little by day. Mr. Parkinson does not breed any cows, but buys those which have had 1 or 2 calves from the dairies and cottagers, and feeds them off. Bulls are fed off as well, and occasionally a bull is run with the cows in order to keep them still during the summer. Sometimes calves are bought, and reared upon cows which only give a small quantity of milk, and taken off at the latter end of the year. They are generally kept till they are two years old, and caked and setoned as calves for black water. No string is put into the hole, but uvæ ursi are inserted with a lump of grease, which swell the breast, cause a strong discharge, and gradually rot out. If the cows take kindly to them the calves run with them on seeds during the summer. After November the drape cows are kept tied up, or in separate boxes, as they knock each other about so much in the yards, and the calves are kept in the yards on pulped turnips, 1 lb. or $1\frac{1}{2}$ lb. of oilcake, barley straw, oat straw, and wheat chaff with pulp. The drapes are generally sold out to butchers about May 1st.

No pigs are bred, but they are purchased in September from the cottagers round, kept a year, and finished off on barley flour, when they make some 28 stone of 14 lbs. Palm-nut meal is used, and they will take to it if they have never tasted barley flour and see nothing else but wash and green stuff. The meal costs 16*l.* 5*s.* for 2 tons, delivery included, and as 12 pigs eat it, and are generally worth about 4*l.* 10*s.* apiece more when it is finished, it pays a good percentage. It is steeped in water and put into troughs like wash.

The flock consists of 170 ewes at Leyfields and 400 at Hexgrave. They are bred originally from Burgess and Wiley, but for 15 years Lincoln tups have been used, and increased the weight of the fleece not a little. The Lincoln tup is not a high-priced one, and generally brings in a 14-lbs. fleece the first season and a 11-lbs. fleece the next. After their second clip they are always secure of a sale to the Derbyshire coal country, where quantity is more a consideration than quality of mutton. The ewes are tupped on young seeds or on grass. They eat all that wants ploughing up for wheat, and are very

seldom taken off the grass to fold before Christmas. Sometimes the wether hoggs have the best of the turnips, and the ewes follow them. The ewes had oats this year and some rape and mustard which were sown on wheat stubble as a last resource. Lambs out of grass last winter cost 4*d.* a week in corn and cake. Their fare was also eked out with dried grains from London at 7*l.* 15*s.* a ton with delivery. The shearling hoggs generally kill at about 18 lbs. The wool goes to Bradford, and the hogg fleeces generally count three to the tod. On the clay at Leyfields the ewes clip quite as well as the hoggs, but on the sand they fall behind them. As a general thing ewes do best at Leyfields and hoggs at Hexgrave. About 1500 sheep are clipped annually, and their wool made 1000*l.* last year, which is 300*l.* below what it realised in the previous year. The lambing shed (with its walk down the middle) is worthy of notice, and very ingeniously run up with poles, hurdles, and straw. It serves for 20 ewes at a time, and is put up at about 6*s.* expense; the poles and hurdles will do again, and the straw for thatching.

The horses are of the big Lincolnshire breed, and if well got up they would sell as dray horses in the London market. There are ten at Leyfields, and 22 at Hexgrave. The harvest is worked with two-horse waggons, and a heavy load of wheat goes to market with six horses, two a-breast. The heavy waggons weigh about 35 cwts. Two or one-horse Scotch carts are also used, and sometimes three horses to the waggons on the clay. Since Mr. Rogers of Ranby's day no bullocks have been worked in these parts. During summer the horses are generally turned into the fields for a few hours after work, and have cut clover and beans in the stable. Chopped clover hay is their principal winter fare. If the pastures are bad during a heavy turnip sowing 14 bushels of oats a week is the allowance for ten. When there is no great pressure in summer the hours for the carters are from 6 to 2. Very few women are employed, and the rate of labour, which was once 15*s.*, is now 13*s.* 6*d.* per week, and poor rates, highway rates, &c., amount to about 2*s.* 6*d.* in the pound. Ploughmen are hired by the year at from 7*l.* to 20*l.*, and are boarded with the bailiff.

The farm of Leyfields, which has been in Mr. Thomas Parkinson's occupation since his father's death in 1861, is in the parish of Rufford, about two miles from the Abbey, and on the high road between Newark and Worksop. It is held under Mr. Henry Savile, and comprises 400 acres, of which 110 are in old pasture. The late Mr. Parkinson entered on it when he was 21, and farmed it for 56 years. His father, who had also a long term of it, handed it over to him in a very primitive state, as there was hardly a decent fence upon the place, and not even the sem-

blance of a bush drain. The rent was 16*s.* per acre, and the whole farm would barely keep a score of poor beasts. The roads could only be called such by courtesy, as, if fifteen quarters of wheat had to be sent to Mansfield, only five could be drawn from the granary on the waggon, and the rest was carried in sacks on horses' backs and piled on the waggon when it reached the high road; but the new tenant soon altered that, and made about three miles of good road at his own expense. The farm is situated on high table-land, sloping away on the south side to Beesthorpe Valley, which was formerly full of hop-yards, but they are now all laid down to grass. The late Mr. Parkinson had once 1100*l.* worth of hops from 10 acres, and still hop-cultivation did not pay in the long run. "North Clays" were duly quoted in the Borough, but they could not rival the Kentish and Sussex samples. A good deal of the old pasture at Leyfields, including some hop-ground, was laid down 40 or 50 years ago, and three of the meadows of about 12 acres each are flooded at intervals. It is not done regularly, as the brook is small and it cannot be turned on at will. In a lucky season from 30 cwt. to 2 tons of hay can be got from them. No top-dressing is used beyond merely forking the dung about. There are about 12 to 14 acres of hay at Leyfields, and the same of red clover, which is not sown more than once in 10 years.

Nearly all the fields are watered by putting down troughs in the drains, which have always an abundant supply of good water. Much of the draining on the arable land was done 40 years since; when furrow drains were put in at every 8 or 9 yards, and a quantity of deep drains on the low ground, which catch the deep water and tap the springs from the hills. The draining upon about 60 acres of the farm, taken to in the last 20 years, has been done chiefly by the tenant, the landlord giving the tiles.

Leyfields is just on the edge of Sherwood Forest, which in 1609 extended from Nottingham to Doncaster, over a tract of some 95,000 acres. Beyond a few oak trees it may be said to be quite disforested, and, in fact, there is very little timber on it. The hedges, of blackthorn, have got good hold of the clay, and are kept high as a shelter to cattle till they form pretty formidable bullfinches. The fields are from 10 to 16 acres.

The land is suitable for oats, wheat, and barley if the season be dry and they do not get late on to the ground to sow it. There are no bare fallows, and the rotation is oats or beans out of pasture, wheat, turnips, barley, seeds two years. If the land is laid down with red clover for mowing, wheat follows and oats or beans are omitted.

The turnips are principally Skirving's purple-tops, with a few

white. Mangolds are only grown to a very limited extent, and only one or two acres are annually under potatoes, as the Isle of Axholme, with its deep black loam, is looked on as the potatoe garden of the district. Chevalier barley is the only sort sown, and in dry seasons it will weigh 57 lbs. to the bushel. White oats have been used, but the Scotch potatoe answers best. The sand land broken up from seeds, and not strong enough for wheat, has grown good crops of oats of 12 stones to the sack, or 42 lbs. per bushel, and oats have also followed barley with a good result where the seeds did not grow. Chidham wheat was used at first, but it grew tired of the land, and black heads appeared. The weight and quality remained, but the bulk fell off. Sheriff's horned wheat answered for a time, but it came at last too delicate and light in the straw. It retained its quality, and made 10*s.* more than good ordinary red wheat, and one lot of it last year touched 86*s.* The Essex rough chaff (white) has, however, been most uniformly successful.

For 12 years during the late Mr. Parkinson's life Leyfields had a great name for its herd of pedigreed shorthorns. It was a pursuit in which he took great delight, and he, like his son, frequently judged both at the Royal Agricultural meetings, and those of the Smithfield Club. Cossack, of the Booth blood, and a calf at the late Mr. Richard Booth's Studley sale, and Lord Spencer's Orator, which went back to No. 19 at Mason's sale, were his earliest bulls, and Cassandra was the most famous matron of the herd. She was the dam of Cramer, Collard, and Clementi, the former of which has won the first prize for aged bulls at the Shrewsbury Royal for Mr. J. B. Stanhope, M.P. Mr. Parkinson took the same place at Bristol in 1842 with "Sir Thomas Fairfax" (5196), bred by Mr. Whitaker, and at Northampton in 1846 with that pretty bull "Captain Shaftoe" (6883), bred by Mr. Lax. His price was 320 guineas at the Trusthorpe sale, and he was sold at the Leyfields' sale in 1847 for 140 guineas. This fall in price was owing to his uncertain temper. There were a large number of Gwynne heifers in the herd, and one of them had twins by Cossack which proved the first and second prize calves at the Yorkshire Show, and made 135 guineas. The bull trade was always pretty brisk, and principally with Mons. St. Marie and the French Government. "Captain Shaftoe," who was only in Mr. Parkinson's possession for a year, was a red without any white, rather feminine in the head, and rather short in his hind quarters, but with good shoulders and fine loins. He was rather small, and got remarkably compact good heifers, from which some of Mr. Majoribanks' prize winners sprang. He had a remarkable dislike to a black coat, and this peculiarity nearly cost Mr. Parkinson his life on the sale day.

Geology.*

The distribution of the soils on the Hexgrave and Leyfields farms is shown on the map (p. 450), and the relative positions of the deposits by the section on p. 451. The uppermost deposit is the New Red Marl, celebrated agriculturally as being the subsoil of the great dairy districts. The surface is in this district a good deal diversified, the hills and valleys having, as a rule, a form regulated by the dip of the beds; on the west are steep escarpments, and to the east gentle inclinations. Beneath this formation is the Lower Keuper Sandstone and Marl, the general character of which corresponds with that of the New Red Marl, varying only by reason of the greater or less prevalence of sandstone-beds. On the farms in question both these subsoils yield strong land, and are treated by Mr. Parkinson as true clay soils, but they are usually characterised by the prevalence of sandstone-beds, which preponderate more in the upper part of the Lower Keuper Sandstone, and gradually disappear upwards as we get well into the New Red Marl. The lower portion of the former division, however, yields locally a blueish clay of stronger character, so that it is impossible with such variations to predict whether a farm consists of strong land or light merely by knowing the age of its subsoil.

The remaining division is the most important one for our purpose; it is known as the "Pebble-beds and Conglomerate," and it occupies a very large area in the county of Nottingham, constituting, indeed, the whole of the forest-land of the celebrated Sherwood. It consists of beds of yellow, brown, and red sandstone, varying in structure from hard consolidated beds to loose sand. But their characteristic feature is the pebbles, sometimes forming a hard conglomerate, and at others lying loosely mixed with the unconsolidated sand. With this poor sandy and gravelly soil it is not surprising that the forest of Sherwood existed so long, or that so large an area is still retained as woodland and common.

On the forest farms which will presently be described, this formation is the only one represented, with the exception of occasional patches of drift gravel and sand of very recent geological date. It is not easy to distinguish this recent superficial formation from the older deposit of sand and pebbles, for on the surface they are generally mixed together. Owing to the similarity in the composition of these formations, whence arises the difficulty, their distinction has very little agricultural importance, for the soil is almost, if not quite, identical over both

* This is for the most part abridged from the 'Memoirs of the Geological Survey. Explanation of Sheet 82 SE.'—H. M. J.

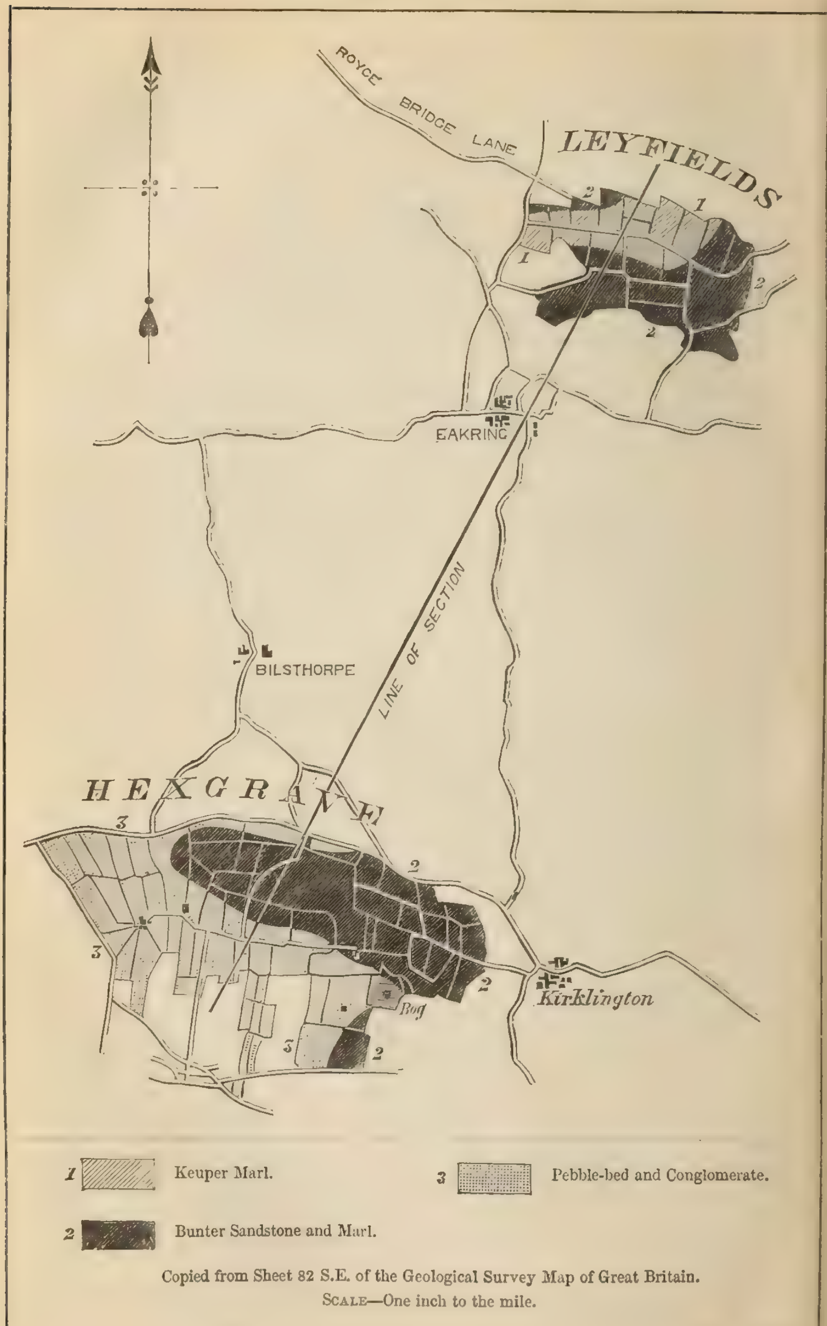


Fig. 1.—*Geological Map of Hexgrave and Leyfields.*

deposits. When drift is thickly spread over a limestone or a marl, the case is altered; for the character of the soil is different from what it would be if the native rock lay close below. Instead of the wet clay soil natural to the marls, one would meet with gravelly and sandy land.

The curious water-bearing property of these alternating porous and impervious rocks is described by my colleague, Mr. Dixon, in the following paragraph:—

"Edingley, which lies about midway between Hexgrave and Southwell, is the property of Mr. Richard Milward, but is retained by him in his own hand. This farm consists of some 200 acres, and belonged originally to 14 or 15 holdings. It cost on the average about 40*l.* an acre, and 30*l.* more in improvements during 10 years. It sorely needed them, as it barely grew 12 bushels once, where it now grows 5 quarters. The soil is of all sorts—white clay, black sand, red gravel, and red sand, with boulder stones in every field. At one time there was no riding over its marsh-land, and the pedestrian had to jump from hassock to hassock. Every field has streams through it, and summer and winter the drains keep up a constant discharge, which finds its way into the bed of the Greet. When they drain they find sand with water boiling up, and if they go down 20 to 30 feet to reach the springs, the water flows up almost like a geyser. One of these 'boils' is specially kept and covered over as a curiosity."—H. M. J.

Fig. 2.—Section across Hexgrave and Leyfields.

1. New Red Marl.
2. Lower Keuper Sandstone and Marl. } Strong Land.
3. Pebble-beds and Conglomerate,—the subsoil of the light Forest-land.

II. Forest Farming. By H. M. Jenkins.

The site of the ancient forest of Sherwood furnishes some of the best examples in England of successful farming under circumstances of great natural difficulty. The subsoil consists of a sandy conglomerate, and is covered by a very light sandy loam of poor and hungry character. Little is yielded by it alone; and the farmer looks upon it more as a vehicle whereby he can convey fertilizing materials to his crops, than as a producer of their natural food. The Forest farms are therefore notably characterized by the extensive use on them of cake, bones, and other artificial manures; and they mostly agree in possessing a very small quantity of permanent grass land.

The Forest having been recently enclosed, the fences are very uniform and neat; they are planted in straight lines on the flat, and possess an even height of about $4\frac{1}{2}$ feet. They measure 4 feet across at the base, and are neatly trimmed to an acute ridge, reminding one vividly of Eastburn in every particular, except that they are not so wide across the water-boughs. The trimming is done by the day, and the system is to dig the roots whenever the fields that they bound come into fallow.

As examples of Forest farming, I shall give an outline of the practice pursued by Mr. Enoch Hodgkinson at Morton Grange, and by Mr. T. Wilkinson at Ranby, both of these farms being very well known by repute, and the latter especially as the home of the late Mr. Rogers. In addition to these farms, it will be interesting to describe the process whereby Mr. Ashton of Hodsock Lodge has been enabled to get useful grass-land on very unpromising soil, and to notice the salient points of his system, although his farm can hardly be said to come within the boundaries of the "Forest."

Grass-Land.

Morton Grange measures 759 acres, only 30 of which are in permanent grass; and Ranby Green Mile farm measures 550 acres, only 20 of which are in grass. They are fair representatives of the "Forest" farms and system of farming. Of the small quantity of grass-land at Morton Grange, all but 8 acres has been laid down by Mr. Hodgkinson. This was done 30 years ago, the seeds having been sown with barley, and the land afterwards treated with bones—as much as from 30 to 40 bushels per acre, in the aggregate, having been put on it. Large quantities of cake and turnips are eaten on it.

Ranby was very heavily boned by the late Mr. Rogers in the earliest days of bone-dressing, when bones were cheap. He was not particular as to size or character, and as to quantity he never was satisfied. Most of this farm has received as many as 80 bushels per acre; and even to this day you may pick up at every other step one of "Mr. Rogers's bones." It may be a split humerus 8 or 9 inches long, or a horse's tooth, or the mandible of a sheep; but their abundance at this remote date testifies to the extraordinary profusion with which they were used.

At Hodsock, Mr. Ashton has recently laid down 30 acres of grass, the seeds having been sown after turnips without a crop. After the turnips had been eaten off, the land received a lighter preparation than it would have done for barley. It was not ploughed so deep, but was rolled more completely. In April 8 bushels of mixed grass seeds, with 6 or 7 lbs. of white Dutch clover, and from 4 to 5 lbs. of rape were sown per acre. The

rape was eaten off by sheep with a good allowance of linseed cake. No artificial manure was used previous to sowing, but 1 quarter of bones per acre was given annually for a few years afterwards, and on 20 acres that quantity was also applied at the time of sowing. Altogether Mr. Ashton has now more than a hundred acres of grass on a farm not more than 376 acres in extent; but only the lighter portion of it is comparable with that on the Forest. This latter is grazed by home-bred stock, which are usually sold off at 2 years old; but the stronger grass is stocked with older beasts, fifteen of which are annually bought for the purpose. The sheep which the seeds will not carry are also turned into the pastures —generally she-hoggets, draft ewes, and some bought sheep. The great feature, however, in the management of the grass-land, is the extensive use of bones, which have been applied to it at intervals during the last quarter of a century. They are used as half-inch and dust as they come from the mill, without any preparation whatever. December and January are considered the best months for boning pastures, and immediately after mowing the best time for meadows. The first dose given by Mr. Ashton was 20 bushels per acre, and in some instances a similar quantity was given again after an interval of two years; and subsequently, after a greater or less lapse of time, smaller dressings, of about one quarter per acre, have been given occasionally, in some cases as often as annually for four or five years together. After this treatment one can easily credit the statement that the grass-land now produces more than twice as much as it did formerly. The quality also is better, white Dutch clover and plaintain having increased to a very marked extent, while oat-grass and cocksfoot have diminished in a corresponding degree. If any farmyard manure can be spared, it is put on in February.

Arable Land.

The Norfolk 4-course shift generally prevails in the Forest, subject, however, to small variations, owing either to the liability of the land to become "turnip-sick," the roots then getting anbury and "finger and toe;" or to the paucity of the grass; or, lastly, to some of the land being more adapted to growing wheat than barley. At Ranby, the first and last of these contingencies are thus provided for:—(1) wheat, (2) turnips or potatoes, (3) barley or wheat (a small portion), and (4) seeds. At Morton Grange the course is exactly the same, but owing to the scarcity of grass about 30 acres of seeds are kept two years, and on 9 acres of black peaty gravel nothing is grown, as a rule, except mangolds, cabbages, and an occasional crop of tares. This practice on soil of that character appears to be not unusual in and about the

forest, as we saw the same thing at Hodsock Lodge, and it is explained by the fact that this black gravel grows mangolds better than any other crop, and "mangolds do not tire like other things." On some very light gravelly land (about 40 acres) at Hodsock there is still another variation of the 4-course system, oats being taken after seeds, and wheat after turnips.

1. *Wheat.*—The seeds are manured with from 8 to 10 one-horse loads of farmyard manure,* the practice at Ranby being to put it on a short time before ploughing, while Mr. Hodgkinson has become a convert to the practice of putting it on in July; but the former method is the one typical of the district. This variation affects the whole subsequent treatment. The seeds having been manured not more than a fortnight, and sometimes immediately before ploughing, the land is ploughed from 4½ to 5 inches deep, pressed, and sown broadcast without delay; indeed, at Ranby not more than one field is ploughed at a time, the seed almost following the plough, as forest land sets quickly. Sowing is done during the month of October, from 9 to 10 pecks being used per acre; the sort most in vogue is still Hunter's White (sometimes called Scotch Brown), as it was five-and-twenty years ago, when Mr. Corringham wrote his Prize Essay on the Agriculture of Nottinghamshire. At Morton Grange, the seeds having been manured in July, the land is ploughed from 8 to 9 inches deep in October, and sowing commences at the end of the month with 9 or 10 pecks of Hunter's White, getting finished off by Martinmas. Turnip-land wheat is not sown so early, and the quantity of seed used is larger, being increased as the season advances to about three bushels at Christmas. "Chidham" is a favourite sort on turnip-land. A usual top-dressing is 1½ cwt. of guano, except after turnips eaten off by sheep with cake; and from 4 to 5 cwt. of salt is also used in the spring, especially after turnips, as it prevents canker (poppies) if got in before they strike. The land is harrowed immediately after salting, and is always harrowed early in the spring, as soon as it is dry. Mr. Ashton's practice nearly corresponds with that of Mr. Wilkinson, except that he likes to drill his turnip-land wheat, and is not quite so anxious to sow immediately after ploughing, the reason being that his land is not so light. Horse and hand hoeing are either both done by daywork, or the latter is let at from 2*s.* to 3*s.* per acre. It is not usual to hoe more than is

* When manure has run short, Mr. Wilkinson has used 7 bushels of bones as a substitute; and Mr. Ashton, in such cases, uses either bones or rape-dust on the seed-land.

absolutely necessary, but wheat after turnips generally requires a good deal, as it is liable to canker.

Harvest at Ranby and Morton Grange is earlier than is general in the district, and in consequence a large number of Irish and other labourers can be easily obtained. Mr. Hodgkinson often puts as many as 90 to 100 men to work at once, at prices varying, for different crops and in different seasons, from 7*s.* to 14*s.* per acre, including mowing, sheafing, raking, and cocking the rakings. Carrying is done as day work by his own men, and thatching is also done by the day, in consequence of the difficulty of getting it well done by the piece. About six years ago Mr. Hodgkinson bought a reaping machine, but he has not cut 20 acres with it, in consequence of the abundance of labour at his harvest-time. Were that time delayed a fortnight the conditions would be reversed, and labour almost impossible to obtain.

Both wheat and barley are put in long stacks, measuring about 11 or 12 yards in length, by 4 to 5 in width; they have gable ends, and hold about 40 quarters of corn, a quantity sufficient for one day's threshing by a steam-engine. The stacks are usually pared, and when thatching is done by the piece, as is sometimes the case at Ranby, thatching and paring cost from 8*s.* to 10*s.* per stack. Threshing is generally done by means of a portable steam-engine, which, if hired, costs about 28*s.* per stack (= per diem); the farmer finds everything except two men to drive and feed the engine, and he gives them their victuals.

2. *Roots.*—In the forest a very large proportion of the roots consists of swedes, and a correspondingly small breadth of white turnips is sown. At Ranby, where the land available for this shift measures 130 acres, not less than 100 will be swedes, only 10 acres being white turnips, and the remaining 20 potatoes, At Morton Grange the course is 170 acres in extent; about 110 are generally swedes, 30 potatoes, 18 mangolds, and only about a dozen white turnips. The system of tillage is to clean the stubbles by scarifying, as often as may be required, before wheat sowing commences, and to plough in winter, after wheat sowing is finished. At Ranby the land is then worked down by dragging and harrowing, and afterwards it is cross-cut with the plough. Dragging and harrowing is again resorted to, and sometimes a third ploughing is given. In the spring the land is ridged up, and about 8 loads of farmyard manure, or bought Sheffield muck per acre is put in the ridges; and after they have been razed 2 cwt. of guano is sown broadcast. The ridges are then split, and the seed drilled alone, at the rate of 2 lbs. per acre. A portion of the swedes are annually grown on the flat, both at Ranby and at Hodsock, in which case the land

is manured in the autumn, and the guano is sown broadcast at the same time as on the ridged land.

At Morton Grange the practice is somewhat different. The land is share-dragged and got as clean as possible in the autumn, and left for about a month; after wheat sowing they half-plough (termed "baulking"), missing every other furrow, and throwing the furrow ploughed upon the one missed; by the time the whole of the 160 or 170 acres are thus done, the first portion of it is ready for the succeeding operation (known as "double baulking"), which consists of turning it back again, and thus both sides of the ridges are exposed.* This practice is thought to keep the land more even than the cross-cutting, as there must be an inequality of tilth where the furrows cross. In the spring the land is dragged, harrowed, rolled, and thoroughly cleaned, being ridged up just before sowing, between May 20th and July 10th. If the land has been manured for wheat, little or none is given for turnips, but an extra quantity of artificials is then used, namely, about 3 sacks of bones, and 4 or 5 cwt. of rape-dust. When the land has not been manured for wheat, from 8 to 10 tons per acre are used for turnips, and a smaller quantity of rape-dust. 2½ lbs. per acre of Skirving's swede are sown on ridges 26 inches apart, the plants being set out to 11 inches.

Hoeing twice and singling are done at Ranby for 6*s.* per acre, a lad following the hoe to do the singling; but at Morton Grange it is done by the day, at increased wages, as it is found to be more carefully done on this system, which is especially necessary, on account of the enormous quantity of grubs which infest the turnips there.

Swedes are principally consumed on the land by sheep with cake; but about one-fifth are drawn off for feeding beasts.

The tillage for white turnips is the same as for swedes, except that rather less seed is used. The kinds most in vogue are the white globe, red and green round, and grey stone.

For mangolds, which are grown at Morton Grange and Hodsock, the land is prepared in the same manner as for turnips, being done a little earlier, and given rather more manure. From 4 to 5 lbs. per acre of a variety of yellow globe mangold are sown near the middle of April, and the roots are ready to take up about the end of October or beginning of November. Mr. Hodgkinson prefers to draw only about one-half of his, the remainder being eaten off on the land by *female* sheep, as he finds this root injurious to rams and wethers, by causing renal disease, and finally death. Mr. Ashton, on the contrary,

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* Mr. Ashton also pursues this plan.

takes up the whole of his mangolds, has them topped and tailed, and put in pies, the roots being covered, first with straw, then with from 3 to 4 inches of earth immediately, an open space being left at the top until hard weather begins. Taking up, topping, tailing, and covering with the tops costs about 8*s.* per acre; the covering is done by women, and one woman will earn at this work as much as 3*s.* per day. It is the practice to begin using them, in small quantities, in September or October, and they are always thoroughly cleaned before they are given to the cattle.

Potatoes.—The land is prepared in the same manner as for mangolds or turnips, but the rape-dust is more liberally applied, reaching as much as 7 cwt. per acre; and the same quantity of farmyard manure is given as for mangolds. Planting is done between the middle and end of March, with about 15 bushels of whole sets; pink-eyed regents are a favourite sort, though Scotch rocks and white regents are also used. The ridges are 26 inches apart, as in the case of swedes, and the after-management consists of hand-hoeing where necessary, and then ridging up with the double mould-board plough. At Ranby the potatoes are forked up and got rid of during the month of July, when the tops are immediately ploughed in, and mustard sown for early autumn keeping. At Morton Grange, however, it is not usual to plough up until October, when the crop is sent to the Manchester and Sheffield markets.

3. *Barley.*—As soon as the turnips are off, the land is either scarified or lightly ploughed, to keep the manure from being washed off the surface. Spring ploughing is done from the middle of March to the first week in April, about 5 inches deep, and as soon as the land is dry enough it is drilled with from 9 to 10 pecks per acre of Chevalier barley, or "Poor Man's Friend" (at Morton Grange). On some land wheat is sown instead of barley in this course, as already described. Barley is harvested in the same manner as wheat, at a little less cost; but on account of the redundancy of the clover crop in some instances, the Northumbrian system of setting it in separate sheaves is practised on some farms.

4. *Seeds.*—Formerly seeds were not sown until the barley was well up; but of late years the practice has been to sow immediately after the corn is in, and even in some cases to sow barley and seeds together. This last, however, is not thought the *best* plan, though sometimes it is the most likely to secure a good plant. When the barley is up it is by some farmers rolled lightly if the seeds are in, but, if not, the Cambridge roll is used, the seeds being sown and lightly rolled immediately after; Mr. Hodgkinson, however, seldom rolls barley, and never uses

the Cambridge roller. For pasture the following mixtures are used:—At Ranby 11 lbs. of white Dutch, 3 lbs. of trefoil, and $\frac{1}{4}$ peck of perennial ryegrass; at Morton Grange 8 lbs. of white Dutch, 2 lbs. of plantain, 1 lb. of alsike, 2 lbs. of parsley, and 1 peck of dwarf ryegrass; while at Hodsock the quantities are 12 lbs. of white Dutch, 4 lbs. of trefoil, and from 1 to $1\frac{1}{2}$ peck of ryegrass.

The proportion of land sown with red clover varies from one-half of the shift at Ranby to one-sixth at Hodsock, Morton Grange showing a medium system of from one-fourth to one-third. As a rule, not more than one-half of the red clover is mown. The mixture used at Ranby is from 12 to 14 lbs. of red clover, and $\frac{1}{4}$ peck of perennial ryegrass; at Morton Grange it is 8 lbs. of red clover, 2 lbs. of trefoil, and 1 peck of ryegrass; and at Hodsock it is 12 lbs. of red clover, 2 lbs. of trefoil, and $\frac{1}{2}$ peck of ryegrass.

Sheep.

The description of sheep generally kept in the Forest is about half Leicester and half Lincoln, and the number of breeding ewes kept on farms where there is little or no permanent pasture must depend entirely on the success with which "seeds" can be produced. At Ranby there are 300, from 50 to 70 being gimmers, and at Morton Grange there are 350. Lambing begins about the end of February, and the lambs are weaned on clover eddishes, with cake about the end of June or beginning of July. Seeds are the only summer food available for the ewes and lambs, and these are entirely depastured by them and the she-hoggs required for breeding next year. In the autumn it is the custom to buy in hoggets for feeding during the winter, and in the beginning of September they begin to go on white turnips, which are given sliced with mixed (cotton and linseed) cakes, and sometimes maltcombs. The quantity of stock to be kept during the summer is always reduced to the smallest possible number, and generally by the middle of April or beginning of May no sheep except breeding ewes and she-hoggs remain on the farm. At Ranby, during the winter, however, as many as 1000 sheep are kept, the usual weight of the best hoggets being 20 lbs. per quarter, and the fleeces weighing 10 lbs each.

Cattle.

No breeding herd is kept at Ranby; but between 20 and 30 yearlings are annually bought to graze off the seeds, and are fed off in stalls as two-year olds. In the autumn a sufficient number of stronger beasts are bought to consume the straw; 8 lbs. of oil-

cake per day is allowed them with other fodder, and they are sold, as they get fat, in the spring and early part of the summer. Pulping roots for cattle and chaff-cutting are done by horse-power.

At Morton Grange a breeding herd of 20 cows is kept, many of them having a place in the Herd Book. In summer there will be from 50 to 60 head of cattle on the farm, and from 80 to 100 in the winter, as the turnips and straw will keep considerably more stock in winter than the seeds and pasture will in summer; thus arises the prevalent practice in the Forest to buy largely both cattle and sheep in the autumn and sell them in the spring; and it is generally preferred to buy rather good shorthorn heifers. The feeding beasts get cut straw, and sliced or pulped turnips (though Mr. Hodgkinson does not think pulping worth the trouble), with from 4 to 12 lbs. (according to circumstances) of mixed linseed, cotton, rape cake, and locust beans.

Pigs.

About 50 pigs of a small white breed are kept at Ranby, and from 80 to 120 at Morton Grange. The usual practice is to sell them off at one year old, weighing over 20 stone, and the sows after they have had one litter. The food in winter consists of rotten and small potatoes, supplemented in the summer by cabbages and mangolds (at Morton Grange), especially if the potatoes run short, as well as by barley meal, rice meal, and Indian-corn meal, which are mixed with the steamed potatoes.

Horses.

The number of horses is not quite 3 per 100 acres; they are kept all the year round in stables, standing in pairs, except when they are turned out into the foldyards at night. In winter they get chopped clover, hay, and straw, with about 1 peck of a mixture of bean meal, oatmeal, and bran per diem. In the summer they are turned into the foldyards, and get tares as they are mown, with a little chopped straw, and a smaller quantity of corn.

Labour.

Farm labourers in the Forest get from 13*s.* to 15*s.* per week, and, as a rule, no privileges*; the carpenter receives 3*s.* per diem, and the hedge cutters 2*s.* 9*d.* The two cottages at Ranby are inhabited by the shepherd and foreman: the former gets 14*s.* per week, a cottage and garden rent free, and, as his garden

* Mr. Hodgkinson allows each of his labourers 7 sacks of potatoes every autumn.

is not very large, he gets an additional allowance of potatoes; his other emoluments are 1*l.* for helping in harvest time, 1*l.* for lambing time, 2 bushels of malt per annum, and some milk from the house every day. The foreman at Ranby boards four lads, but several farmers on the Forest still adhere to the old system of having the lads in the house. The foreman gets his cottage and garden rent free, potatoes found him, and from 15*s.* to 18*s.* per week, with 5 bushels of malt, the milk of one cow, and the privilege of buying 60 stones of bacon at 5*s.* per stone, seconds flour at 2*s.* per stone, and bread flour at 1*s.* 10*d.* For boarding the youths he gets 6*s.* 6*d.* per week each in money, 15 stones of bacon, and 5 bushels of malt per lad.

A good many boys are employed at from 8*d.* to 1*s.* per day.

Artificial Manures.

The expenditure on artificial manures by most of the Forest farmers is very great; for instance, Mr. Wilkinson spends at Ranby, on a farm of 550 acres, between 1000*l.* and 1200*l.* per annum on cake, notwithstanding that his tenant-right claim, which is the one general in the district, is not more than one-fourth after the first year, and one-eighth after the second. Bones are held in great estimation by both landlords and tenants, and their use is encouraged by a liberal tenant-right agreement all over the forest, namely, first year the whole outlay, second year three-fourths of the cost, and third year one-third.

An ingenious system of dissolving bones is carried out at Morton Grange, as follows:—About 20 tons of shoddy from Dewsbury are bought annually, and mixed with the blood of animals slaughtered on the farm; with this is put 20 qrs. of half-inch bones, and sulphuric acid is added at the rate of 1 cwt. per qr. The mixture is allowed to remain for two or three weeks, when another 20 qrs. of bones are added to it and the whole thoroughly mixed together. It is then used as required for turnips.

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5. *The Lodge Farm, Castle Acre, Norfolk, in the occupation of* Mr. John Hudson.* By H. M. Jenkins.

This farm consists of 997 acres of land, and was taken by Mr. Hudson in the year 1822, together with an adjoining farm of 500

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* Since this report was written, Mr. Hudson has ceased to hold a place amongst living English agriculturists, and we have now to mourn the death of one of the first exponents and chief illustrators of the principles and practice of high farming.

acres, which now forms part of the occupation of his son, Mr. Thomas Moore Hudson. The two farms had been refused by three persons before Mr. Hudson took them. They were both poor and foul; and the outgoing crop, which was carried by the new occupier, amounted to 20 bushels of wheat and 24 bushels of barley per acre, while the roots did not enable him to winter more than 10 bullocks. After being cleaned and fertilized by the liberal use of rape-cake, the land gradually improved; and now, after the expenditure for the last 30 years of between 2500*l.* and 3000*l.* per annum in oilcakes and other feeding-stuffs, as well as from 800*l.* to 1100*l.* per annum in artificial manures, according to their price, the 1000 acres will winter from 100 to 140 steers, according to the root crop.

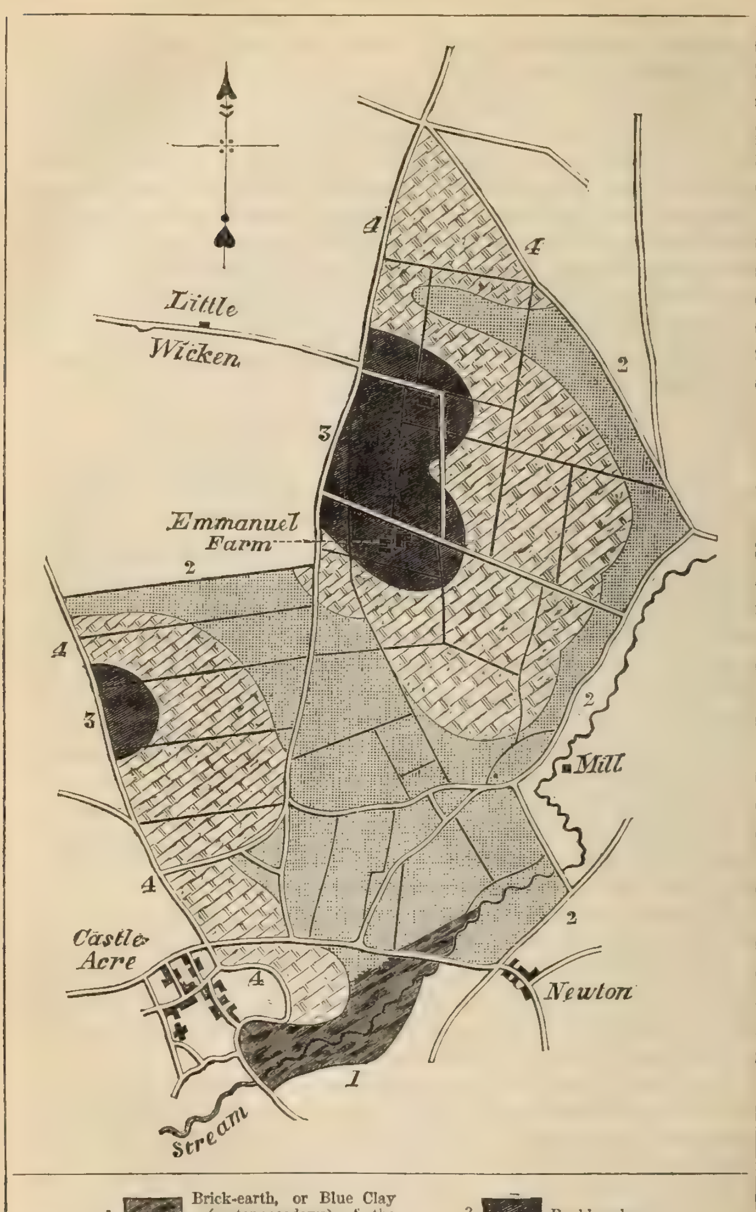
Geology and other Physical Features.

The Lodge Farm commences at the western edge of the great block of chalk on which stand the ruins of the castle which gives its name to the village of Castle Acre. This spot is about five miles due north of Swaffham, and the farm extends from it in a north-north-west direction, the extreme northern point being nearly three miles distant. The south-western boundary of the farm is nearly coincident with the river Nar, and extends northwards to a point opposite, and half a mile westward of, West Lexham. The boundary then runs north-east, along the sole of a valley for most of the distance, to meet the road from Rougham to Castle Acre at the point where it crosses the road to Gaytonthorpe. Here is the sharp angle which forms the extreme northern point of the farm (see map, p. 462); the boundary then turns suddenly south, along the roadside, for nearly a mile, when it makes a bend to the west-south-west until it touches the Peddar Way; and this road it follows southwards to Castle Acre.

Physically the farm consists chiefly of the spurs of two ranges of hills, separated by a wide valley which runs from north-west to south-east, and opens out towards the river Nar in the latter direction; it also includes a portion of the valley of the Nar, and of a lateral valley already mentioned in connexion with the north-eastern boundary of the farm.

The geological features, which are represented on the map, very closely follow the physical. The summits of both the hill-spurs are capped with a drift deposit, which is, no doubt, one of those to which geologists apply the term boulder-clay. One of these patches is very small; it is semicircular in form, the flat side being coincident with the Peddar Way. Of course it extends beyond this farm, and it forms a large portion of the adjoining "Abbey Farm," which was formerly occupied by Mr. Hudson, but which is now farmed by his son. The other patch

Fig. 1.—*Geological Map of the Lodge (or Emmanuel) Farm, Castle Acre.*



1. Brick-earth, or Blue Clay (water-meadows) of the Nar.

2. Drift-gravel.

3. Boulder-clay.

4. Chalk.

SCALE—Two inches to the mile.

is many times larger, and similarly borders the road from Rougham to Castle Acre. In form it is reniform; but the portion on the farm has one straight side formed by the road. The homestead is placed almost in the centre of the southern lobe of this kidney-shaped patch.

Surrounding and underlying each of these two clay patches is a belt of chalk, which is broadest in a south-easterly direction. The smaller and more westerly is again nearly semicircular; but the larger is bluntly lobed. There is also another south-easterly spur from the former of these, which is part of the abruptly-scarped mass on which most of the village is built, and the ruins of the castle and the priory stand. The valley between the two hill-spurs, and most of the remaining land on the farm consists of sand and gravel, some of it very light indeed, especially that in the valley. Bordering the chalk at Castle Acre, on both sides of the Nar, and for a quarter of a mile on the other side of the road leading to Newton, the subsoil consists of a stiff clay well known to geologists as the blue clay, or brick-earth, of the Nar. The features thus briefly described, and delineated on the map, appear now extremely simple. The hills are capped by clay, the valley-sides exhibit the outcropping chalk from beneath, and in the valley-soles the chalk is covered with gravel and sand; while the river-flat, in some places, consists of a freshwater clayey deposit, probably formed by the river itself. But the distribution of these deposits in relation to the river Nar is not a little puzzling, until the idea is forced upon one by repeated failures to understand the distribution of the formations. This district has never been mapped geologically, and the exact ages of the drift-deposits are unknown; but that is a matter of very little consequence from an agricultural point of view. The remarkable feature is that the gravelly deposit does not follow the line of the valley of the Nar, but is quite independent of it; and further, that where the gravel does meet the Nar, the blue clay already mentioned seems to be absent. The gravel-holding valley is dry, that is to say, no stream runs in it; and it has a direction roughly at right angles to the valley of the Nar. It is, in short, what is usually termed a dry lateral valley. On the other side of the river are two similar valleys, at least one of which is in gravel, and both of which meet in a spot nearly opposite to, but a little to the west of, the expanded mouth of the valley with which we are more particularly concerned. Now the form of this valley is not regular, and near the mouth are two hills; one of these projects from the large chalk-escarpment towards and reaching the Nar in the form of a boot, the sole bordering the river, and the toe pointing westward. The other forms a kind of fringe connecting the two other projections of

chalk near the village, and filling up the indentation between them. The physical result of this is, that the actual channel of the valley is thus turned, near its mouth, abruptly westward; and therefore joins and meets the mouths of the two valleys on the opposite side of the river. Whether these gravels and sands were formed by river action or by glaciers (which still remains a moot question), one thing is certain, namely, that they were carried down these *lateral* valleys either by water or by ice, and have nothing to do with the Nar or its valley. This explanation renders the distribution of the gravels perfectly natural, and it also explains the existence of gravel hills at the valley mouths, for there would necessarily be a large accumulation of material where opposing currents met, whether of water or ice. The valley of the Nar seems to be of altogether later date; and the blue clay, which is so characteristic of it, is necessarily still more recent. Where this last-mentioned subsoil exists, the fields bordering the rivers were, at least 60 years ago, for the most part converted into water-meadows.

The climate of the whole county of Norfolk is usually very dry; and it has been observed that if a north wind veers round by the east to the south or south-west, dry weather accompanies it even from the last-named quarter; but if the north wind veers *westward* to south-west, rain is sure to accompany that change.

Drainage.

The water-meadows, which, as already stated, have a clayey subsoil, are the only fields which required draining. This was entirely done by the landlord, who found both pipes and labour, and charged the tenant 5 per cent. per annum on the outlay. The chalk and gravel portions of the farm drain themselves; and even the clay on the hill-tops, though furnished with drain-pipes, never brings them into use, and seldom into play.

Fences.

The fences on this farm consist of quick-hedges, which are planted on banks composed of material obtained by digging a ditch on its north side, which is frequently filled up again when the hedge is well grown. The mode of planting is as follows:—The first spit of earth having been taken out of the site for the ditch, it is put on the bankside upside down, and is generally about a foot in height on the ditch side, sloping down from the ditch to something less. On this foundation of the bank three-year-old quicksets are laid 6 inches apart to grow towards the ditch, and upon their roots are laid about 18 inches more earth. The ditches, therefore, usually attain a depth of from $2\frac{1}{2}$ to 3 feet, and a width of 4 feet at the top, the whole

of the material got out being used to make the bank. The cost of making the ditch and bank and planting the quick is usually from 4*d.* to 5*d.* per yard. It is usual to place a fence of dead thorns, or of post and wire on the top of the bank until the hedge has grown above it; and, if the ditch is on the field-side, hurdles are required to protect the young quick from the attacks of sheep. The quicks are allowed to grow about three years, and are then cut off *upwards* to within 3 or 4 inches of the stump; they are then allowed to grow uninterruptedly for about two years, after which they are begun to be trimmed into a clipped hedge, or "haze." The fences are trimmed to a height of from 2 to 2½ feet above the top of the bank, to a width at the base of from 18 inches to 2 feet, and tapering off to about 6 inches wide at the ridge. Hedges are clipped and trimmed, and the banks cleaned, at odd times just before and after harvest, as day-work. The banks are held sacred as a covert for partridges, whose nests are most jealously guarded by farmers, labourers, and everyone else in the county. Gates are provided by the landlord, the tenant paying 5*s.* each for the cost of making them.

Grass-Land.

The grass-land consists of about 200 acres, all of which is pasture, and fed principally by sheep. From 40 to 50 acres of it are irrigated; but even this, although very good as feeding land, is useless for meadowing. Irrigating is begun in November after the grass has been eaten off, and the water is shifted in succession from one part to another, after having remained a few days on each, until the beginning of March. The cost of cleaning out drains, the river, and so forth, is about 10*s.* per acre annually. Sheep are put on the irrigated pastures by day as soon as there is good feed for them, generally about the end of March or beginning of April.

Arable Land.

Five-and-twenty years ago, when this Society offered a prize for the best Essay on the Agriculture of Norfolk, Mr. Hudson farmed on the indigenous four-field system, and his *modus operandi* was described in some detail by Mr. Barugh Almack, in his commended Essay, published in the fifth volume of this 'Journal.' For some years past Mr. Hudson has farmed on a five-course system, getting some catch crops in addition, as follows:—1, wheat; 2, barley, followed by (*a*) tares and winter-oats, (*b*) early peas, or (*c*) rye for feeding; 3, turnips; 4, barley; and 5, seeds. At present, however, Mr. Hudson is gradually getting his shift back to the ordinary four-course system, as on the whole he

considers it better adapted to the West Norfolk land. This is particularly worthy of mention, because about 11 or 12 years ago the five-course system—taking, however, oats after wheat instead of barley and no "catch crops"—appeared to be finding favour in the eyes of the Norfolk farmers.*

1. *Wheat.*—The clover-ley is manured with 10 loads of farm-yard-manure as soon as possible after the cow-grass has been mown, or the trefoil and white Dutch have been fed off. The manuring is generally done in July, August, and September. The land is then ploughed to a depth of about 5 inches, heavily rolled, sometimes with a Cambridge roller, and harrowed four times; and afterwards drilled with from 8 pecks of Spalding wheat at the commencement of the season, to 10 pecks at the end of the year, the drills being 7 inches apart. It is then harrowed twice, and rolled with a Cambridge roller. In either February or March the wheat is hoed either by horse or by hand, and is top-dressed with 2 cwt. of guano per acre.

Wheat is cut with a Burgess and Key's reaping-machine just before it is ripe; it is sheafed by men and women at 3*s.* per acre, and is shocked by odd hands, the fields being gone over afterwards with wood-tined horse-rakes. The sheaves stand about a week on the shock, and are then put into long stacks on the field where the crop has been grown. This system of stacking is pursued with every kind of crop, and thus the necessity of stack-yards is entirely done away with. The stacks are generally 13 yards long, and 7 yards wide; and the distance from the eaves to the ridge is about 15 feet. The thatching is done at 5*d.* per yard run at the eaves, which is equal to about 1*d.* per square yard. Round stacks of 9 feet diameter at the base were formerly very much in vogue; but they are, comparatively speaking, rarely made now, certainly by no means so frequently as in former years. Threshing is done partly by fixed and partly by portable steam-threshing machines, and the corn is dressed by hand finishing and winnowing-machines. Previous to sowing, the wheat is dressed with Down's Farmer's Friend.

2. *Barley.*—After the wheat is harvested the stubbles are forked over by hand, at a cost of from 6*d.* to 1*s.* per acre, so as to thoroughly clean it and get rid of twitch. The land remains thus until February, when it is ploughed to a depth of about 4½ inches, and dressed with 2 cwt. of guano per acre by means of Chambers's manure-distributor, drawn by two horses. It is then immediately harrowed again, and drilled with three bushels per acre of Golden Melon barley. Sowing commences about the middle of February, and is finished as soon as possible.

* See Mr. Clare Sewell Read's Essay on 'Recent Improvements in Norfolk' in the nineteenth volume of this Journal, pp. 284 and 285.

After sowing, the land is harrowed twice over, but seeds are not sown on the barley in this course. Barley is weeded in June by women, at from 4*d.* to 5*d.* per acre.

The crop is mowed with a Burgess and Key's machine; it is collected with gathering-forks, the land being raked between the heaps; and the corn is afterwards pitched, loaded, and stacked, barley being neither sheafed nor shocked.

Harvesting white crops is generally done by gangs of men who engage for the harvest. Mr. Hudson hires twenty-seven men annually to harvest the white crops, on a farm comprising about 800 acres of arable-land. These men are divided into three companies of nine men each, namely, two loaders, two forks, and five at the stacks. These men get about 6*l.* 10*s.* each for about three weeks' harvest-work, including trimming the stacks, putting up the implements, and clearing up generally.

Oats are seldom or never grown as a white crop, but their place in the rotation would be instead of barley in the course just described.

3. *Roots.*—The 160 acres devoted to this course are generally subdivided as follows:—15 acres white tankard turnips, 100 acres swedes, 15 acres green round turnips, and 30 acres mangolds.

(*a.*) *Turnips and Swedes.*—The barley-stubble is forked over in the same manner as already described in the case of wheat-stubble. After wheat-sowing is finished it is ploughed 6 inches deep; it lies all the winter, and, as soon as barley-sowing is finished, it is again ploughed—across the previous furrows; subsequently it is scarified and harrowed as may be required. In May the land is ploughed again, and ridged in the beginning of June, eight loads of farmyard-manure per acre being put in the ridges. Just before sowing, a dressing of $3\frac{1}{2}$ cwts. of superphosphate, and $1\frac{1}{2}$ cwt. of ground rape-cake, mixed together, is drilled on the ridges; and immediately upon this, 4 lbs. per acre of turnip-seed is drilled with a small seed-drill. All the turnip-seed is sown on the ridge except a small quantity in the autumn, which is sown on the flat.

White tankard turnips are sown for September and October feeding, Hudson's swede (a kind of purple top) for winter use, and green round turnips are sown in autumn after tares (which are sown on barley-stubble after wheat) for use in the spring.

As the turnips come up they are first horse-hoed, then cut out to 11 inches apart, at a cost of 2*s.* per acre, being singled by a gang of women at 1*s.* 6*d* per acre. After singling they are horse-hoed again, and finally, each plant is hoed round—an operation which is locally termed "scouring."

The swedes are pulled when ready, and six drills of them are

placed together in a row; a furrow is then ploughed on each side, so as nearly to cover the roots with earth, and thus protect them from frost, &c. The white tankards are first fed off, being generally consumed before the hard weather commences. They are pulled and sliced for the sheep, to which they are given in troughs, with an allowance of cut hay, and about half a pound of linseed-cake each per diem. After these are finished the swedes are topped and tailed, and thrown into heaps, from which they are sliced and given to the sheep. The green round turnips are fed off by ewes and lambs in March and the beginning of April; and the land is immediately afterwards sown with barley.

(*b.*) *Catch Crops.*—The 15 acres intended for green round turnips perform another duty previous to being devoted to that crop, being sown with either tares and winter oats, or early peas. Rye for feeding is also grown as a catch-crop before green round turnips.

In the first case, after the barley-stubble has been forked over to get out twitch, it is manured with ten three-horse loads of farmyard manure per acre, which is ploughed in 5 inches deep; and the land is immediately drilled with $2\frac{1}{2}$ bushels of tares, and half a bushel of winter oats per acre. This crop is generally fit to mow for the horses about the middle of May, and the land is immediately afterwards ploughed and cleaned, and soon after the middle of July sown with green round turnips.

Early peas are sometimes sown on barley-stubble instead of tares. The land having been forked as before, it is manured with eight three-horse loads per acre; this is ploughed in 5 inches deep, and $3\frac{1}{2}$ bushels of early peas per acre are drilled in about the end of November or early in December, the rows being 9 inches apart. When well up they are hand-hoed at 2*s.* per acre. Harvesting is done the third week in July, the whole strength of the farm being employed in cutting and carrying as quickly as possible. The peas are cut with hooks, and are immediately carted on to a piece of seeds or hay-stubble to ripen. They are laid out in beds with paths between them, so that they may be easily and frequently turned until ripe.

As soon as the peas are carted away the land is cleaned, ploughed, and drilled with green round turnips, and a dressing of $3\frac{1}{2}$ cwts. of superphosphate, and $1\frac{1}{2}$ cwt. of rape-cake per acre.

For rye the land receives the same preparation, except that no manure is applied, and it is sown in September or October, with 3 bushels of Giant rye per acre. This crop comes in for spring food for the ewes and lambs in April. After the rye is fed off the land is ploughed 6 inches deep, rolled with a three-horse roller, and then harrowed. After this treatment it lies for three

weeks, when it is again ploughed and afterwards sown with green round turnips, and treated as ordinary turnip-land.

(*c.*) *Mangolds.*—The 30 or 40 acres of mangolds usually grown are sown on the strongest and best land available in the shift. The land is ploughed and otherwise prepared in the winter, and ridged about the middle of April, when ten three-horse loads of farmyard manure per acre are put in the ridges, and covered with from 2 to 3 cwts. per acre of guano; the ridges are afterwards closed up by a double-breast plough, and drilled with 7 lbs. per acre, generally of long yellow and long red; globe mangolds being grown only on the very best land. Since steam-cultivation has been adopted the land for mangolds has been tilled in the autumn to the depth of 8 or 9 inches, and the seed has generally been got in earlier than formerly, from which great benefit has been derived.

The plants are first horse-hoed, then cut out with a 14-inch hoe at a cost of 2*s.* per acre, and singled, in the same manner as turnips, for 1*s.* 6*d.* per acre, after which they are horse-hoed again.

The mangolds are taken up the last week in October or the first week in November, topped, but not tailed, and put into "clamps" 6 feet wide at the bottom, and coming to a ridge at a height of 4 feet from the base. They are covered with a thick gavel of straw, and afterwards with about 4 inches of mould. The ridge is left open for about a fortnight, after which it is entirely closed. Pulling, topping, loading, and stacking, cost altogether from 6*s.* 6*d.* to 7*s.* per acre according to the crop.

Mangolds are chiefly given to the feeding beasts in the fold-yards, commencing in January or February; these also getting from 10 to 12 lbs. of cake per day, with cut hay or straw; and a few are also used in the spring for fat sheep after the swedes are finished. Mangolds are always sliced with the turnip-cutter.

4. *Barley.*—After the turnips are fed off the land is ploughed, and then allowed to remain untouched until the middle of February, when it is harrowed, ploughed again, and drilled with three bushels per acre of Golden Melon barley. It is then laid down with 20 lbs. per acre of small seeds. The harvesting and other operations connected with barley have already been described in treating of barley after wheat.

5. *Seeds.*—Half the barley of the above course is laid down with 14 lbs. of trefoil and 6 lbs. of white Dutch per acre for summer feeding, and the other half with 20 lbs. of cow-grass per acre for mowing. After sowing the land is harrowed, and, as soon as the barley is sufficiently strong, it is gone over with a one-horse roller.

The cow-grass, of which there would be about 80 acres, is

mown with a Burgess and Key's grass-mowing machine, and the labour is paid for as day work. The stacks are about 5 yards wide and as long as necessity requires. As soon as the hay is off, the land is manured for wheat as already described.

The remaining half of this course is fed off by sheep during the summer, and then manured as soon as possible.

Cattle.

Mr. Hudson does not breed any beasts now. In former years he had, at different times, herds of various breeds; but now all the cattle on the farm, except two or three Alderney cows, are steers bought in during the autumn and fed off during the winter and spring. A few are also bought for summer grazing, but many beasts could not be kept during the summer. From 100 to 140 steers (mostly Shorthorns), according to the root crop, are bought in every year at from two and a-half to three years old, at Peterborough fair—which is held in the first week of October—and any deficiencies are made up at Norwich.

In the winter these steers are kept in lots of about ten or a dozen in small foldyards, having sheds along about one side and a half of each. They get about 2 bushels of roots, and from 10 to 12 lbs. of linseed cake each per diem, as well as a bushel of cut hay (when there is any), or cut straw after the hay is finished; and the yards are well littered with straw every morning. They begin to be sold off in January, and they ought all to be gone by May.

The manure is carted out in January and put into heaps, being subsequently used for mangolds and swedes; that made afterwards is put on the land intended for wheat. The heaps are made in the following manner:—A bottom of good mould, about 6 inches thick, is first laid, and the manure is then carried on by carts, which are drawn on to the heap, tilted, and then return the same way, being drawn over what has just been brought. The heaps are from 25 to 30 yards long, from 9 to 10 yards wide, and about 5 feet high.

When nearly the whole of the winter-fed beasts are sold, a sufficient number are bought to feed off the grass. They go into the pastures in the middle of May during the daytime, and in the evening come up to the foldyards, getting then about 7 lbs. of linseed cake each. If the weather is very hot they go into the pastures by night and remain in the yards all day. The greater the number of these summer-grazed beasts the fewer are those bought at Peterborough.

Sheep.

There are 400 breeding ewes kept on the farm. These are from Hampshire Down ewes by a Cotswold ram, and they, again, put to a Cotswold ram. The ewes are bought-in every year as ewe-lambs, and the rams are, as a rule, hired. The ewes are put to the ram on the best keep that may be on the farm. The lambs, both male and female, are all fed off at from ten to twelve months old, and go to the London market. In July and August as many additional lambs are bought as may be required to feed off the grass and turnips. The hoggets are put on the water-meadows by day as soon as there is sufficient keep for them,—about the end of March. The ewes and lambs are kept on seeds, the ewes having some locust beans, and the lambs a little cake and lentils, until they are weaned in July, when they are put on the clover eddishes. When the tankard turnips are ready to draw, about the latter end of August, some are thrown to the lambs every day until the turnips are ready to be folded off. After the lambs are weaned, some of the ewes are put on the water-meadows, and sold to the butcher as soon as fat.

During the winter the hoggets are kept on cut turnips and swedes with an allowance of cake, going on rye in the spring as soon as the turnips are finished; they are drawn for shearing, for the London market, early in March; and they are generally all gone by the middle of April, when fresh ones are bought for the irrigated pastures, rye, &c. Those on the irrigated pastures by day are removed to the uplands at night. Fleeces range from 7 to 9 lbs. in weight.

The lambing ewes live on anything they can get until a fortnight before lambing, when they begin to receive a few turnips. After lambing, which commences in February, they get better keep, including more turnips or some mangolds.

The hoggets are washed, from 10 to 14 days before they are clipped, by the farm labourers in ordinary wash-pits, except those which go off early in the spring, which are washed in tepid water from the steam engine. Clipping is done by a kind of piece-work, which is practically task day-work. The price paid is 4*s.* and half a gallon of beer per score, but a man is not allowed to do more than a score in one day. Soon after the lambs are weaned, generally towards the end of July, they are dipped in a solution of "Allen's composition."

In February the hoggets are sometimes watered with a bottle, using 1 lb. of arsenic with soft soap and tobacco juice to every score of sheep. As a rule this is not required if the dipping has been properly done in the summer.

Great attention is paid to the arrangements for folding sheep.

Instead of the ordinary hurdle the sheep-pens are enclosed with iron "lifts" which run on two pairs of wheels. They are each 12 feet long, 3 feet 6 inches from the ground to the top rail, and cost about a sovereign; but their durability is proportionate to their cost, as they last more than twenty years. The great gain in using them is that there is no need to drive hurdles or anything else into the ground, when it is hard and dry in summer, thus effecting a considerable saving in labour.

When the sheep are feeding-off turnips in winter, four-inch-square mesh-nets are used before and behind them, the iron lifts being used to divide them into lots of about 300 each. Each of such lots is attended by a strong lad at about 8*s.* per week, a boy at 5*s.*, and another boy at 4*s.*, who top, tail, and cut the turnips, feed the sheep, move the nets, hurdles, and cribs, and do anything else that may be required for the 300 sheep. These cost, therefore, for attendance a little more than 1*s.* per score per week.

When the ewes and lambs are together these arrangements are supplemented by a wooden "lift-hurdle" or lamb-gate, which enables the lambs to run out of the pens and get the best of the feed on the next day's fold before the ewes are put on it, as well as their rations of cake and lentils. This lift-hurdle is about 7 feet long, and the usual height; it is divided into two portions by a horizontal bar midway between the ground and the top rail, and the lower half is subdivided by rolling upright bars 10 inches apart, just wide enough to allow the lambs to get through. The upper half has a sufficient number of uprights to give the whole the requisite strength.

Horses.

From 26 to 28 horses, of the Norfolk and Suffolk breeds, are kept to work 800 acres of tillage, being considerably more than three horses to every 100 acres of arable land.

Fourteen of these horses are kept in boxes; the remainder are fed in stalls and turned into the horse-yards at night. From the beginning of harvest through the winter they get a peck and a quarter of crushed oats and a quarter of a peck of crushed beans; also one bushel of hay, and wheat- or barley-straw, both cut into chaff. This food is continued until the middle of May; they then get as much tares and winter oats as they can eat, leaving off the corn and chaff after they have had green food about a week. In this way they are kept as long as the tares last, generally until the middle of July, when the cow-grass is mown, after which they are turned into the pastures and remain there until harvest begins, when corn and chaff are given to them, and their winter treatment recommences.

Horses are occasionally bred to replace some of those that go off, but not otherwise; and as a general rule they are bought as two-year-old colts, in preference to breeding, for home use. Hitherto the number of horses employed has not been reduced by steam cultivation.

The delivery waggons are drawn by four horses in two pairs, and take 25 sacks of wheat or 30 of barley. With this exception all the yoking is in a line, the carts being three-horse tumbrils, and the harvest waggons drawn in the same manner by three horses in a line.

Labour.

After the elaborate and, we may almost say, paternal methods pursued in the north, the Norfolk system of labour is not very attractive. There is no such thing as a yearly labourer, no boarding paid for by the farmer, and, in short, no connection between master and man except work on the one hand and payment on the other. The bailiff gets a guinea per week, the yardman 14*s.* 6*d.*, the engine-driver 3*s.* per day, and the ordinary farm labourers from 10*s.* to 12*s.* per week. Lads are paid from 8*s.* to 9*s.* per week, and boys from 4*s.* 6*d.* to 5*s.*, while women get from 10*d.* to 1*s.* per day. All the payments are made in money, there being no privileges in addition to the wages. Cottages, with gardens, are paid for by the men at the rate of from 1*s.* 3*d.* to 1*s.* 6*d.* per week; they are tolerably good, and the labourers do not often take lodgers.

A considerable amount of field work is paid for by the piece, as has already been described; but much of it is done under a system of "gangs," one or more of which can usually be got at short notice. These gangs are composed either of men or women, according to the nature of the work. Women generally do the weeding and other light work.

A wheelwright, a carpenter, and a blacksmith, are kept on the farm, and all the carts and waggons, as well as the harrows, are home made.

The labour account, including the wages of the bailiff, blacksmith, carpenter, and wheelwright, amounted last year (1868) to nearly 2000*l.*, or very nearly 2*l.* per acre on 1000 acres of land, about 200 of which are in grass.

Steam Cultivation.

For the last three years Mr. Hudson has had steam cultivating machinery on Fowler's single-engine direct anchor system; the engine is a double cylinder of 10-horse power, and is also used for the threshing machine and other purposes. The chief benefit hitherto derived from steam cultivating is in the root

crops, and more particularly in the crop of mangolds, as previously mentioned. The use of steam has also tended to the substitution of cultivating for ploughing under certain circumstances; for instance, wheat stubbles are now cultivated twice and ploughed once, instead of being ploughed three times.

Before Mr. Hudson bought this set he was in the habit of hiring steam tackle, and paid 8*s.* per acre for cultivating from 9 to 10 inches deep, besides the cost of coal and of carting water; ploughing was done under the same arrangement as to coal and water, at 7*s.* 6*d.* per acre.

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6. *Pitchill, Tilesford, and the Grove, in the occupation of* Mr. Benjamin Bomford. By H. M. Jenkins.

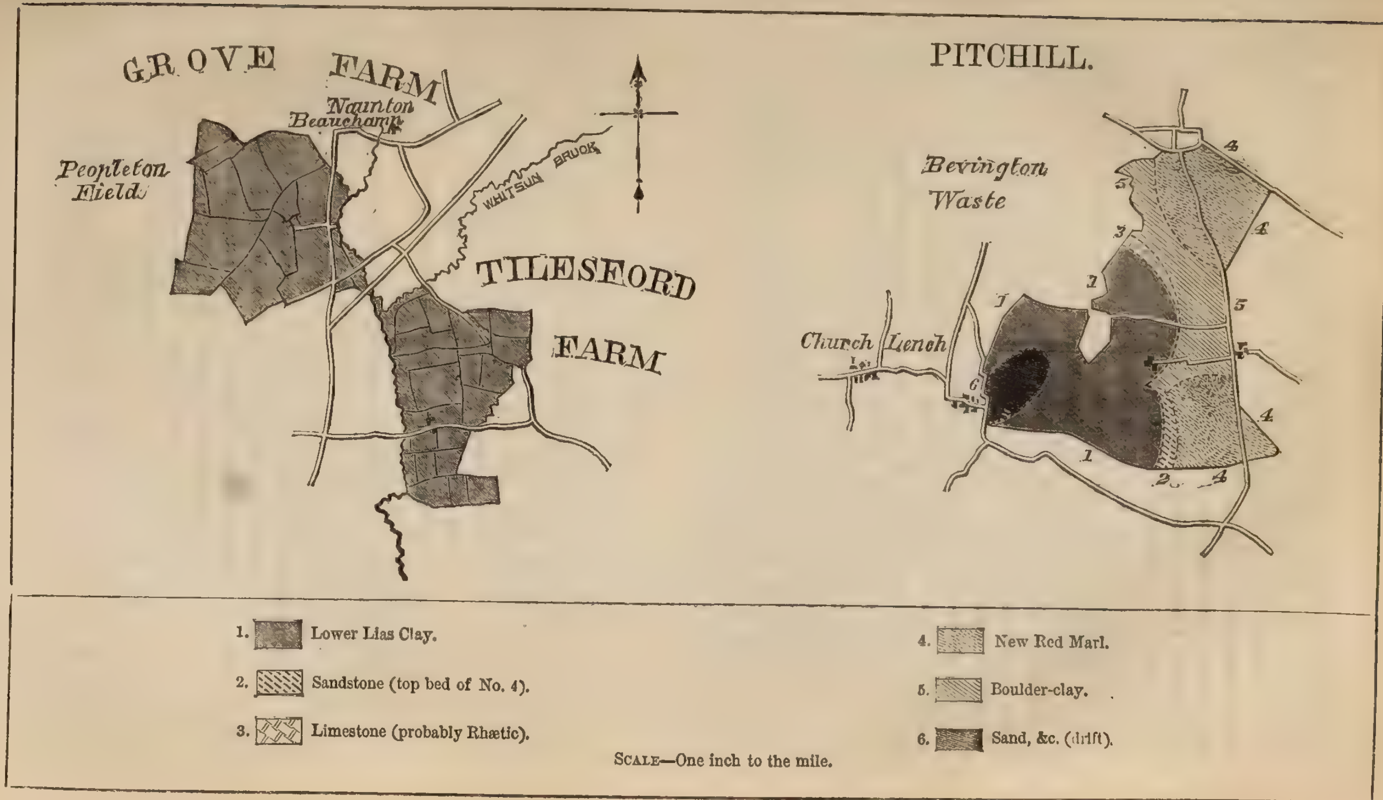
These farms comprise altogether about 1360 acres, the greater portion consisting of very strong clay land, and the whole farmed by a complete system of steam-cultivation. Of the total acreage, the two farms of Tilesford and the Grove, measuring together about 560 acres, and containing nothing but the strongest land, have been recently taken by Mr. Bomford, and are now in course of improvement. The remaining 800 acres constitute his home farm at Pitchill, and consist of three portions, namely, 200 acres of grass land, and 300 acres each of strong land and light land under tillage; this farm, having been in Mr. Bomford's occupation for some years, is in a high state of cultivation, and, notwithstanding the severe course of cropping to which it is subjected, is cleaner than many gardens.

The Pitchill Farm commences on the high road to Alcester, about five miles north of Evesham station, and about half a mile north of the high road called Harvington Leys. It continues along that road for about two miles and a half, and is situated, with the exception of a triangular patch at each extremity, entirely on the western side of it. In a westerly direction it is fenced in by Bevington Waste, except at its south-western corner, where it extends as far as Atch Lench.

The soils of this farm are divided into five principal patches, the northern and southern of which consist of new red marl, the extreme western and the eastern of light-land drift deposits, and the central of a strong heavy lias clay, which is fringed, to a great extent, by a narrow band, consisting of either sandstone or limestone.

The Tilesford and Grove Farms are contiguous, but distant from Pitchill about seven miles, along a devious and cross-country road. They are situated on the banks of a stream, called the

Fig. 1.—*Geological Maps of the Farms in the occupation of* Mr. Bomford.



Piddle, which, after pursuing a somewhat irregular east and west route from its rise north of Inkberrow to near Upton Snodsbury, there turns suddenly southwards and continues that course with variations until it joins the Avon, near Pershore. Between three and four miles north of Pershore the southern boundary of the Tilesford Farm commences on the right-hand bank going up the stream; it continues for nearly a mile and a half on the same side, and the Grove Farm begins just where it terminates, but on the opposite side of the stream, and continues for nearly a mile. Reference to the map will show the general topographical relations of the two farms; and the fact of their situation in reference to the stream will be sufficient to indicate the nature of their physical geography. The Tilesford Farm is situated on the eastern slope of the river valley, and the Grove Farm on the western; the differences being that the latter extends a little beyond the boundary of the valley proper, while the former, though strictly confined to the valley of the stream, is divided into two unequal portions by a lateral valley, which has a direction at right angles to its course.

Geologically both of these farms present a monotonous continuity of lias clay; and the only variation observable in the soils is that they are somewhat lighter on the hill-tops, and slightly stronger in the valleys.

Drainage.

The drains at Pitchill were laid many years ago, so that nothing authentic can be said about them. When Mr. Bomford took the farm it presented the same appearance as most other clay-land farms in the district, the surface being regularly undulated with the ridge-and-furrow of the "lands." At present nothing of this kind is to be seen, the flat surface of the boulder-clay plain being as uniform as the rounded contour of the hills composed of new red marl.

At Tilesford and the Grove the ridge and furrow still rule the surface, and most of the drainage there has been done under Mr. Bomford's supervision during the last few years. The drains, as a rule, run along the furrows, and are constructed of 2-inch pipes, main drains consisting of pipes varying from 3 to 6 inches in diameter, according to the feeders. The outfalls are set in brickwork, and are furnished with grates as a protection against vermin. The distances of the lines of drainage vary according to the breadth of the lands, from as little as 6 to as much as 12 or 14 yards apart. The cost of draining is, on the average, about 4*l.* per acre for both labour and pipes. The Tilesford drainage has been performed under an agreement with the land-

lord, by which he pays for the labour and charges the tenant 5*l.* per cent. per annum on the outlay.

Fences.

At Pitchill the fields ranged originally from six to twenty acres in extent, yielding an average, probably, of about ten acres. But now, on the arable land, nearly the whole of the internal fences have been taken up to admit of steam-tackle being more easily and conveniently employed. Eventually the few fences that still remain will be taken out, and the farm will then be intersected by steam-roads a quarter of a mile apart, that being the length of the rope. Indeed, it may as well be mentioned, once for all, that facilities for steam-cultivation are at Pitchill held to be of the greatest possible importance. It is essentially a steam-farm.

Practically we may regard the boundary-fence as the only one on the Pitchill Farm, and as that is comparatively new, it may be described as a good example of the fences of the district. Quicks from four to five years old are planted on the flat in a single row, about 9 inches apart; they are then allowed to grow about five or six years, and are then "platted" and trimmed in what is known as the Warwickshire fashion. Afterwards they are trimmed twice a year at a cost of one halfpenny per perch each time for trimming both sides, and they are gradually trained to a stack-shape, measuring 3 feet across at the base, being a little wider at the eaves, and coming to a ridge at a height of about 4½ feet from the base.

The old fences at Tilesford and the Grove are on banks, but they are gradually being swept away, and eventually the arable land on each of these farms will be simply an enormous field like that at Pitchill.

Grass Land.

The meadow land, consisting of something more than 100 acres at Tilesford and the Grove, lies alongside of the river, and is liable to be flooded. Hay-making is done once a year at a cost of about 3*s.* per acre and 5 quarts of cider, the practice being to break the swath by machine and to finish the work by hand as day-work. The aftermath is grazed with cattle and sheep; but neither roots nor artificial food is given on it.

The pastures, at Pitchill, are old, and measure about 200 acres, the fields having an average size of from 10 to 15 acres. The usual practice is to fold off the first bite with ewes and lambs, and afterwards to graze with cattle and sheep. A portion of the pasture land is manured every year with ¾ cwt. of guano, ¾ cwt.

of nitrate of soda, and 1 cwt. of superphosphate per acre, put on by a manure-distributor. Another part also receives a dressing of mixed soil and lime in the winter.

Arable Land.

Mr. Bomford's occupation consists of three portions, namely, the outlying strong clay-land farms at Tilesford and the Grove, comprising 560 acres, of which 140 are in grass; the Pitchill (or Home) strong clay-land farm, consisting of 500 acres, of which 200 are in grass; and the light land at Pitchill, measuring about 300 acres, all in tillage. We have therefore to deal with about 720 acres of strong clay-land, and with about 300 acres of light land under tillage. These two descriptions of land are farmed on different systems, arranged chiefly with a view of obtaining as much winter keep for sheep as possible on the light land portion of the Home, or Pitchill, farm. This is a matter of absolute necessity, as it is impossible to winter sheep on the heavy and wet lias clay which forms the strong land on the three farms.

Commencing with wheat the rotation of crops pursued is in each case as follows:—

Strong Land (six-course).

1. Wheat.
2. Pulse (winter and spring beans)*.
3. Wheat.
4. Green crops, viz. mangolds, cabbages, or vetches, followed by rape or mustard.
5. Barley or wheat.
6. Seeds.

Light Land (four-course).

1. Wheat.

2*a*. Winter beans, followed by rape and turnips.	2*b*. Early peas, followed by rape and turnips.
3*a*. Wheat, followed by vetches and oats.	3*b*. Barley, followed by rape and turnips.
4*a*. Swedes.	4*b*. Mangolds.

Returning again to wheat.

* Peas were occasionally taken instead of beans before the land had been got into sufficient condition for the latter.

I. Strong Land Crops.

1. *Wheat.*—Wheat is taken (*a*) after seeds, (*b*) after beans, and (*c*) after half the strong land green crops.

(*a.*) The seeds have consisted either of broad clover or of ryegrass. The former is steam-ploughed once about the beginning of September, and the latter is burst up in July, and steam-cultivated twice. About the 20th of October wheat sowing commences, using two of Smyth's steerage drills, with 7 pecks per acre, the quantity of seed being increased a little as the season advances; the sorts usually sown are Browick Red and Golden Drop. Although, as a general rule, no manure is used for wheat after seeds, Mr. Bomford thinks that the results hitherto obtained by means of steam cultivation on strong land justify him in the belief that a smaller quantity of seed will prove sufficient, and he has determined to try the effect of carrying this idea into practice.

(*b.*) The land is treated for wheat after beans the same as after ryegrass, as soon as the crops are harvested.

(*c.*) As fast as the green crops are cleared off, the land is ploughed once, and otherwise treated the same as after broad clover.

If the land is clean Mr. Bomford has a decided preference for ploughing instead of cultivating for wheat. He generally ploughs rather light for this crop, from 6 to 8 inches deep, but he does not consider moderately deep ploughing injurious, if the land is allowed to get firm and stale before sowing. After ryegrass a thorough cultivating is a matter of necessity.

The after management consists of one harrowing and rolling, followed by horse and hand hoeing once or twice as may be required.

Harvesting is done at a cost of from 18*s.* to 20*s.* per acre, including mowing, getting, and thatching; the price for mowing, sheafing, and stooking being 11*s.* per acre and 5 quarts of cider. Reaping machines are not used, as at this time of year all the horses on the farm, which have been reduced to a minimum by steam cultivation, are required for hauling.

2. *Beans.*—For winter beans the wheat stubble is manured with 20 one-horse cartloads of foldyard dung, and then steam-ploughed once. The seed is drilled by the middle of October, 2 bushels being used to an acre. For spring beans the land receives the same preparation as for winter beans, about $3\frac{1}{2}$ bushels of seed per acre being sown in February. The system of after management is to harrow once, then to horse and hand hoe the rows twice at about 4*s.* per acre.

Harvesting is done at the same price as wheat, but beans are "fagged," instead of being mown with a scythe.

3. After harvest the stubbles are steam-ploughed, or cultivated twice, and sown with wheat. Ploughing is preferred if the land is clean, as it is then left much firmer for wheat.

4. *Green Crops.*—These consist of (*a*) mangolds, (*b*) vetches followed by rape, and (*c*) cabbages.

(*a.*) *Mangolds.*—The wheat stubble is manured and prepared in the autumn in the same manner as for beans; in the beginning of April it is run over with a two-horse skim,* the drill following with 4 cwt. per acre of Griffin and Morris's patent mangold manure, consisting of patent dissolved bones, sulphate of potash, and sulphate of ammonia. Immediately afterwards yellow globe mangold, 8lbs. per acre, is drilled on the flat, and as soon as the plants are visible they are hand-hoed once, and then horse-hoed, men to single the plants following the horse-hoe, after which they are horse-hoed two or three times, as may be required. Hoeing twice and singling mangolds and turnips are done by a gang of six Irishmen at 10*s.* per acre. The drills are 24 inches apart, and the plants are set out to from 16 to 18 inches.

Mangolds are taken up in October, topped and tailed on the ground if possible, but otherwise as they go into the pits, which are made long and not very wide. The roots are covered with a little straw and with mould, vents being left open at intervals on the ridge, and never stopped. They are not used until the swedes are finished. Mangolds are got, topped, and tailed at about 12*s.* per acre.

(*b.*) *Vetches followed by Rape or Mustard.*—The wheat stubbles are cultivated or ploughed once, and drilled, commencing in September, with 3 bushels of winter vetches per acre, a little artificial manure being applied in the spring if necessary. They are eaten off during May on the land, which is then fallowed for barley or wheat, but the earliest of them are succeeded by rape, and the next lot by mustard. After one ploughing or cultivating, 4 lbs. of seed and 3 cwt. of superphosphate are drilled per acre; the crop is eaten off by sheep, and the land is immediately ploughed up for wheat.

(*c.*) *Cabbages.*—About 20 one-horse cartloads of foldyard manure per acre are put on the wheat stubble, and steam-ploughed in during the autumn. The plants are generally grown at home in seed-beds; but they are put in at from 10*d.* to 1*s.* per thousand, the rows being 2 feet apart, and the plants 15 inches. They are horse and hand hoed, and artificial manure is applied at the time of hoeing. They are eaten off by lambs in July and August.

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* Fowler's combined plough and subsoiler will in future be used for autumn cultivation for mangolds and cabbages, and his new steam harrow in the spring.

5. *Barley or Wheat.*—The land for barley is steam-ploughed in the autumn and left until the beginning of March, when it is run over with a two-horse skim, and sown with 3 bushels of Golden Drop or Chevalier barley per acre. The seed-bed is rolled as soon as possible, and sown by a seed-barrow with 16 lbs of broad clover and 4 lbs. of trefoil per acre.

Mowing barley is done at 3*s.* per acre; it is seldom sheafed, and carrying and stacking are done by the usual farm labourers as daywork.

The wheat in this course is treated in the same manner as after broad clover; but in the spring, after hoeing, it is sown by a Holmes's seed-drill with $\frac{1}{2}$ bushel Italian ryegrass, 8 lbs. of white Dutch clover, and 4 lbs. of trefoil.

6. *Seeds.*—Broad clover is generally mown about the beginning of June, just as it is coming into bloom; afterwards the sheep are folded on it with a little corn or cake, and as soon as it is eaten off, the land is steam-ploughed for wheat.

The ryegrass and seeds are grazed until July, when the land is prepared for wheat as already stated, it being considered highly injurious to keep ryegrass on the ground after the 1st of July.

Broad clover being taken only on half this course, it comes only once in twelve years, and thus clover-sickness is avoided; but Mr. Bomford has never found clover to fail on the few occasions when he has sown it upon barley which has immediately succeeded wheat.

II. Light Land Crops.

1. *Wheat.*—On the light land wheat is taken:—

(*a.*) After swedes or mangolds drawn off.

(*b.*) After rape and turnips sown upon winter beans.

(*a.*) The mangolds are drawn off first, and the swedes soon after, all the roots being got in by the end of November. The land is then steam-ploughed immediately, and the wheat sown as on the strong land previously described. Early in March it is top-dressed with a mixture of artificial manures, consisting of $\frac{3}{4}$ cwt. of guano, $\frac{3}{4}$ cwt. of nitrate of soda, and 1 cwt. of superphosphate, put on with Smyth's manure distributor. The after management and harvesting are for this and the following course of wheat the same as on strong land.

(*b*). This belongs to course No. 3 in this shift, but may as conveniently be disposed of here. The sheep having eaten off the rape and turnips (receiving on the land two meals of chaff and a small admixture of pulped roots, as well as some corn or cake) by about the last week in November, the land is steam ploughed immediately, and the seed, consisting of 2 bushels

per acre of Grace's white wheat, is got in the first week in December.

2. *Winter Beans, or Early Peas, followed by Rape and Turnips.*

(*a.*) *Winter Beans.*—The wheat stubble receives one steam ploughing soon after harvest, and in the middle of October 2 bushels of seed per acre are sown in double rows, that is to say, the rows are alternately 10 and 30 inches apart. No fold-yard manure is given on the light land, as large quantities of chaff, with pulped roots, are given to the sheep feeding off the catch-crops; in this manner a large proportion of the straw is consumed on the land, and thus directly applied to it, instead of being trodden in the foldyards. Early in spring the wide furrows get three or four horse-hoeings, the narrow ones being similarly cleaned by hand at a cost of 4*s.* per acre for hoeing twice. The beans are sown in "double rows," because by that means it is possible to horse-hoe them longer, and get a better tilth for the rape and turnips than if done in the ordinary way.

(α) *Rape and Turnips upon Winter Beans.*—Immediately before the last horse-hoeing, namely, about the middle of May, about 3 lbs. of rape and 1 lb. of green round turnip are sown per acre with 3 cwt. of superphosphate. These seeds come up, but make little progress until after the beans are cut, which is generally about the last week in July, after which they make a start. About the latter end of August they are hoed once if labour can be spared; and about the last week in October they are begun to be fed off either by lambs or older feeding sheep, with the chaff and pulped roots as already stated.

(*b.*) *Early Peas.*—The land is prepared in precisely the same manner as for winter beans, and as early as possible in the spring the seed, consisting of 3½ bushels per acre, is drilled in rows 10 inches apart. When ready the peas are hoed twice, either by horse or, preferably, by hand. They are cut either with the scythe or the hook at the rate of 4*s.* 6*d.* per acre, about the middle or end of July, when the land is immediately prepared for the succeeding crop of rape and turnips.

(β) *Rape and Turnips after Early Peas.*—As soon as the peas are off, the land is steam-cultivated once, and ploughed if necessary; and the same mixture of rape, turnips, and manure is drilled as in the previous case (α), the crop then coming in soon enough for the sheep to come on it after they have finished (α), the rape and turnips upon winter beans.

3. This course consists either of (*a*) wheat following rape and turnips on winter beans, or of (*b*) barley following rape and turnips after early peas. The wheat has already been disposed of, so it will be as well to describe the barley tillage first, and then the mode of obtaining the catch-crops in this course.

(*b.*) *Barley.*—The rape and turnips after peas are begun to be eaten off by sheep the first week in November, artificial food being given them upon it. After the green crop is finished, the land is prepared and sown the same as on the strong land, except that no seeds are sown on the barley.

(*α*) *Rape and Turnips after Barley.*—Barley is generally harvested early in August, immediately after which the stubbles are scarified, and the same mixture of rape, turnips, and manure drilled in as in the previous cases. The crop comes on in time to be fed off after the rape and turnips which follow early peas.

(*β*) *Vetches and Winter Oats after Wheat.*—The wheat stubbles are ploughed once immediately after harvest, and early in September drilled with 3 bushels of winter vetches and 1 bushel of winter oats. About the end of February the crop is top-dressed with $\frac{3}{4}$ cwt. of guano, $\frac{3}{4}$ cwt. of nitrate of soda, and 1 cwt. of bones, put on with the manure distributor. It is eaten off by sheep after they leave the last bit of rape and turnips, and they get on it an increased quantity of artificial food.

4. *Roots.*—This course consists of (*a*) mangolds after rape and turnips sown on barley stubble, and (*b*) swedes after winter oats and vetches sown on wheat stubble.

(*a.*) *Mangolds.*—The sheep are generally cleared off the rape and turnips by the last week in March, when the land receives, as quickly as possible, two steam cultivatings crosswise, and one steam ploughing after. This treatment secures a good seed-bed, and that great desideratum being obtained, the same system is pursued as in the case of mangolds after wheat on the strong land.

(*b.*) *Swedes.*—As soon as the winter oats and vetches have been eaten off, which is generally by the end of May, the land is cultivated and otherwise prepared and manured in the same manner as for mangolds, 2 lbs. of seed being sown per acre. In every respect swedes are treated in the same way as mangolds, both previous to the crop being ready for use and afterwards. None of them are fed on the ground, the whole being topped and tailed, put in "buries," and drawn to the different homesteads as required for the stock. The cost of getting, topping, and tailing swedes is less than for mangolds, being 10*s.* per acre instead of 12*s.*

Cattle.

About 140 beasts, chiefly shorthorns, are kept for breeding and feeding, the number bred being usually about 30. The remainder are bought as they may be required, and worked off

gradually during the winter and spring months, being sold either at fairs or by private contract.

The feeding stock are kept in stalls, and given a liberal allowance of pulped mangolds, chaff, flour, and oil-cake.

The store stock run in the foldyards during the winter, living chiefly upon chaff, with a few pulped mangolds, and 4 lbs. of cake or flour per day. In May they are turned out for the summer into the pastures.

Sheep.

About 400 breeding ewes are kept; they are a cross of Cotswolds and Hampshire Downs, and are put to Hampshire Down rams. About one-fourth are annually drafted, and the crop of lambs is generally in the proportion of about $1\frac{1}{4}$ to each breeding ewe. About the first or second week in September the ewes are put to the ram on fresh pastures, about 60 being allotted to each. After tupping they get very few roots for some time, but a large quantity of chaff,—roots in any quantity being considered highly injurious at this time.

Previous to lambing the allowance of roots is gradually increased, and the ewes are brought at night into the fold-yards, where they get hay during lambing time. As soon as possible the ewes and lambs are drafted away to the pastures. In the winter the sheep are kept entirely on the light land, and eat off the catch crops. These consist of two kinds, namely, (1) rape and turnips following (*a*) winter beans after half the wheat of the previous course, and (*b*) early peas of the remaining half, as well as (*c*) the barley which follows the rape and turnips after the early peas of the preceding year; and (2) winter oats and vetches following the wheat which succeeds the rape and turnips after winter beans. These are fed off in succession in the order in which they are given. The rape and turnips on the bean stubble having been fed off by the last week in November, with the assistance of about $\frac{1}{4}$ lb. of corn or cake, with hay chaff the first thing in the morning, and a good meal of chaff and pulped swedes every evening, the sheep go on to the equivalent crop after peas, which is eaten off with a similar allowance of artificial food. The remaining crop of rape and turnips, after barley, is eaten off in succession after the last, with an increased quantity of corn or cake, and is generally finished by the last week in March. As soon as it is finished the sheep are folded on the oats and vetches after wheat, and the quantity of corn or cake is increased to about 1 lb. each per diem, and the allowance of pulped mangolds and chaff is similarly augmented. The home-bred sheep are worked off as shearlings during March and April, and about 500 teggs are bought in during the spring, and folded on

vetches and other green crops during summer, getting also a little cake. In the winter they are put on roots at Pitchill, as just described, and are worked off by about the end of February, being clipped and either sent to fairs or sold at home.

From 800 to 1000 sheep are kept at Tilesford and the Grove during the summer, 200 being ewes and lambs, and the remainder older feeding sheep. They go there as soon as the vetches are ready, and remain there until the green food is exhausted, when they are taken to their winter quarters at Pitchill.

It will thus be seen that the system of farming pursued by Mr. Bomford is almost entirely regulated by the necessity of providing a large quantity of sheep-food on his light land during the winter. He is enabled to do this without losing any corn crop by the almost exclusive and very prompt use of steam-cultivating machinery; and he makes it a rule to increase the quantity of artificial food given to his sheep while these "catch-crops" are being fed off as the season advances, so that the less time he allows to the succeeding crop the more artificial stimulus he gives to it.

Pigs.

About 60 pigs, of the Yorkshire breed, are annually fed on pulped and boiled mangolds, mixed with flour in a hot state. They are usually sold at 12 months old, weighing from 12 to 16 score.

Horses.

Mr. Bomford's farms being cultivated almost entirely by steam-power, the number of horses has been reduced to a minimum, and only a sufficient staff is kept to do the harvesting work, cart the dung, and so forth. The consequence is that a large proportion of the stables have been converted into boxes for feeding beasts.

The number now kept to do the work on 1360 acres, mostly consisting of the strongest clay land, is thirty, being exactly two-thirds of what would be required without steam-cultivation. Mr. Bomford considers, however, that it would be impossible for any number of horses to do the same work and produce the same results as the steam-ploughing machinery. In summer the horses are fed on vetches and clover; and in winter they have an allowance each of 200 lbs. of corn per month, with 3 cwt. of hay, and an unlimited supply of chaff, &c. They are worked indifferently in line or abreast as circumstances require.

Manures.

The manure made in the feeding stalls is spread over that in the foldyards, so that when drawn the two may be thoroughly

mixed together. In spring the yards are cleared out, and the manure is carted to the nearest point where it may be required for use, the practice being, within certain limits, to use farmyard manure by preference on the home portions of the farm, and artificials on the outlying fields. The carts tip the manure, are drawn over the heap, and return over what they have just brought, so as to consolidate the heap. Between hay-making and harvest the manure has one turning; and immediately after harvest all the available force on the farm is used to put it on the stubbles in readiness for steam-ploughing.

Labour.

Day labourers get 11*s.* per week and no privileges; but they are employed on piece-work about one-half their time; and boys of different ages are employed at from 4*d.* to 1*s.* per diem.

Shepherds and carters have good cottages and gardens in addition to their wages; engine-drivers get 1*l.* 1*s.* per week.

Seven pairs of these cottages have been built on the Pitchill Farm, at a cost of about 180*l.* per pair; they contain good kitchen and every requisite convenience, some of them have two and others three bed-rooms.

For the last 20 years six Irishmen have come every spring, and have been hired for the season, generally remaining until November or December, the same men coming every year. They do the hoeing of turnips and other roots at the prices already given, as well as the harvesting and storing of both white and green crops, besides dung-carting, and any other work which may be required. A carpenter and a blacksmith are also continuously employed on the farm, the latter doing most of the repairs to the steam-tackle.

Steam-Cultivation.

Mr. Bomford's use of steam-cultivating machinery was described by Mr. John Algernon Clarke in this Journal * more than two years ago, so that, although this is the prominent feature of Mr. Bomford's farming, it is unnecessary to travel again over ground already so thoroughly explored. All that I have to do is to mention the points on which Mr. Bomford's practice now differs from what it was at the time when that Report was written.

At the date of that Report Mr. Bomford farmed 1200 acres, of which 900 were arable; he now occupies 1360 acres, of which 1020 are arable. He now effects a saving of 20 horses,

* 2nd Series, vol. iii., pp. 272–276.

notwithstanding the disadvantageous circumstances attending his recently acquired holding, in consequence of the extension of his means of cultivating by steam. In every respect his tillage operations are more exclusively arranged "with a view to steam" than they were two years and a half ago. Instead of the "large enclosures averaging 20 to 40 acres each," we see the arable land at Pitchill thrown almost into one great field. At the outlying farms also, we see that the fields of 4, 5, or 10 acres each are gradually undergoing a process of "dissolution," and that they are slowly but surely taking rank, *ad eundem gradum*, with Pitchill. These results have been accomplished by Mr. Bomford having carried out the intention which he announced to the Society's Committee in 1867. At that time he possessed "a couple of 12-horse engines," purchased of Savory and Son, of Gloucester, in 1864, and respecting this power we read that "Mr. Bomford is not satisfied with it, and he intended (so he told us—not to get rid of it, but—to buy another; not in lieu of the present machinery, let it be understood, but a second 'double-engine set,' so that he may have two pairs of engines at work upon his farm at one and the same time!" This quotation is copied *verbatim et literatim*, even to the note of admiration at the end. But what is the fact at the present time? Mr. Bomford possesses two of Fowler's 14-horse power double sets. One of these was purchased second-hand, and the other new, the latter costing him 1460*l.*, which included, besides the two engines, 800 yards of steel wire rope, and a new cultivator.

Many tenant-farmers will ask, How can this expenditure be rendered remunerative? Therefore it may be desirable, even at the risk of some repetition, to give a sketch of Mr. Bomford's mode of utilizing so much power, and getting a paying percentage on the outlay of so much capital.

To begin, it must be remembered that Mr. Bomford occupies, practically, two farms 7 miles apart, and that he keeps a double-engine set at each occupation. Almost the whole of his tillage operations are performed by steam, and whenever he does not require his steam-tackle on his own farm, he has plenty of "orders" to execute for his neighbours. Indeed, so great is now the anxiety to hire his steam-tackle,—a desire produced, no doubt, by force of example,—that last spring Mr. Bomford informed me that he would soon be obliged to purchase a *third* double set! As a matter of fact it may be stated that from the middle of May until the land becomes too wet, Mr. Bomford's two double sets have as much work to do for himself and his neighbours as can possibly be accomplished by them, notwithstanding that the men make as much as eight days per week, while the light will allow them to work so much over-time.

With so many demands, Mr. Bomford has occasionally found it a little difficult to arrange with the farmers who hire his tackle respecting their order of precedence; but now he generally works one district at a time, and leaves all arrangements to be made with the foreman; but subject to this division of service for convenience of locality, he adheres strictly to the rule of "first come, first served."

On his own farm, the steam-tackle is brought into use immediately after harvest. For roots he prefers deep ploughing where no farmyard manure is used, otherwise he restricts it to a depth of 9 inches. On strong land a four-furrow plough does from 8 to 10 acres this depth during a day of ten hours; but on light land a six-furrow plough is used, and gets through from 12 to 15 acres per day. Cultivating is now done with one of Fowler's patent turning cultivators. This is a very powerful implement, and will smash 15 acres per day of strong land, the first time with seven tynes in; and 20 acres per day of light land, or crossing the strong land, with 11 tynes in. I saw this implement at work on a very heavy piece of ground, and it certainly seemed a wonderful example of deep cultivation under adverse circumstances. In walking after this implement, one moment you might be poised on a pinnacle, with barely room for the toe of your boot, and the next sink down to your knees in a perfect sea of tilth. No doubt much of this was due to the power used, two 14-horse-power engines, and the great improvement is due to the introduction of the "turn-round" principle.

In steam-cultivation on a clay farm the great desideratum is to get all the work done as soon as possible, certainly before the land gets wet; no effort is therefore spared to accomplish this object, and by the middle of October every stubble has received its quota of autumn cultivation. The light land, however, is more tractable, and therefore furnishes a certain amount of work during the winter for the steam-tackle, which may really be said to follow the sheep. The spring work does not commence until after the spring green-crops have been eaten off, so that it cannot actually begin until about the first week in April, and it then progresses slowly until the middle of May.

As tackle will not last for ever, it may be of interest to learn the calculations of so experienced a man as Mr. Bomford for wear and tear of machinery, interest of capital, &c. He calculates on the following scale:—

Interest on capital expended	5 per cent.
Repairs (on account of wear and tear)	7 per cent.
Redeeming fund	5 per cent.

The last-named item deducted *annually* would repay the capital in fourteen years, which, therefore, subject to the other charges

enumerated, is the length of time which a good set of tackle is expected to last.

Tilesford Farm.

This farm, consisting of 360 acres, of which about 100 are in permanent pasture, was taken at Michaelmas, 1864. The subsoil is a stiff lias clay; and the state of the drainage, the foulness of the land, and the poverty of the crops would require the pen of a "Talpa" to render them picturesque. All that I have to do is to show by what means such a farm has gradually been rendered dry, clean, and fertile, without any excessive expenditure, and without the loss of a single year's crop, except in a few fields where twitch, onions, or wild oats were unusually luxuriant. In describing this history, it will be most conducive to clearness and facility of comprehension if each field be taken in succession, just as their courses of cropping were described to Mr. Randell and myself on the ground.*

Grass Land.

Home Field.—This is a piece of permanent pasture, measuring about 10 acres; the greater portion of it has been very much improved by draining and folding sheep on it in the summer, giving them artificial food. The effect of manures has also been tried, and a mixture, consisting of $\frac{1}{2}$ cwt. of nitrate of soda, $\frac{1}{2}$ cwt. of guano, and 1 cwt. of superphospate per acre, which had been spread over one of the lands early in the year by the manure distributor, as an experiment, had, in April, made a very conspicuous mark.

The remaining portion was so bad that it seemed necessary to have recourse to some extremely vigorous means of improving it. Accordingly, it was broken up and dressed with 100 cubic yards per acre of burnt clay; and the next spring it was planted with swedes, then with mangolds the year after, and again with mangolds the third year, the usual manures for those crops being given in each case. When the land is considered clean enough and good enough it will be laid down again for permanent pasture.

Long Furlongs.—At present this is a very poor pasture, measuring about 24 acres; but the land is somewhat lighter and better than most of that on the farm, so it will be ploughed up very soon. Hitherto the improvement of it has been confined to such matters as a thorough draining and the removal of superfluous timber. A regular grove of trees has been removed; and three or four hedgerows, besides numberless clumps of gorse and

* The details of the management and improvement of the Tilesford Farm were communicated to us by Mr. Bomford's very intelligent foreman, Mr. James.

brambles, have also been swept away. The function it has performed meanwhile is that of a place of refuge for sheep in wet weather, and being situated on the summit of a gentle hill, it is well placed for the purpose. The land is better adapted for tillage than pasture, and it will probably be turned to that purpose in the autumn.

Duck Meadow.—This is a small piece of permanent pasture, measuring about 4 acres. Five years ago it was a swamp, but it has been thoroughly drained and is now a very useful piece of grass. The other grass-land was in the same condition in 1864, and has since been treated in the same manner as the two closes already mentioned, so that it will be unnecessary to describe them in detail.

Arable Land.

Lower Bushels.—At present this field measures about 23 acres, but formerly it consisted of two distinct closes of 7 and 16 acres respectively. Ultimately, it will, like most, if not all of those to be hereafter described, be thrown into one great field, crossed only by steam-roads a quarter of a mile apart.

The 7-acre portion was in 1864 a very bad lot of seeds, which were ploughed up and sown with beans that autumn. In 1866 it was wheat, in 1867 vetches, in 1868 wheat again, and this year it is peas.

The 16-acre portion was, when the farm came into Mr. Bomford's possession, a wheat-stubble so foul that it required special treatment to get it at all clean; and although it was ploughed up and cleaned in the autumn, it was found necessary to leave it a bare fallow the next year (1865) to allow of its being got into decent condition for a crop. After that was accomplished the following succession of crops was obtained:—Oats in 1866, seeds in 1867, wheat in 1868; and this year it is partly winter vetches and partly peas.

Big Bushels.—Twenty acres of land which in 1864 merited no better description than "old twitch." In 1865 it was in vetches, eaten off by sheep; and in 1866 wheat, manured heavily, either with about 24 one-horse loads of farmyard manure per acre previous to ploughing, or with a dressing of guano in the following spring. Seeds were sown upon the wheat, and as they failed the land was broken up and fallowed the next year. In 1868 it was wheat, and after harvest the stubbles were ploughed up and sown with winter oats and vetches.

Oldfield Ground.—This now measures about 34 acres, but in 1864 it consisted of three nearly equal fields, averaging a little more than 11 acres each. In that year the first part was beans bestrewed with an abundant crop of wild oats, which necessi-

tated its being left a bare fallow in 1865. In the autumn it was sown with wheat, and in the spring laid down with seeds, which were fed off in the summer of 1867. In 1868 it was again wheat, and this spring it had a very promising crop of winter beans.

The second portion, which was rather the largest of the three, was in a somewhat better condition than the rest; and although the crop of wheat which it bore in 1864 was very poor, it was possible to carry out something like the usual system, namely,—beans in 1865, wheat in 1866, beans in 1867, seeds in 1868,* and this year again wheat.

The third part also bore a wheat-crop in 1864, but the stubble was so foul that the land was left a bare fallow and thoroughly cleaned the next year, being sown with wheat in the autumn. In 1867 it was vetches fed off; in 1868 wheat again, and this year peas.

These fields comprise the whole of that portion of the arable land which is situated south of the road called Long Lane, leading from Throckmorton to Peopleton. Crossing this road we come, on the western side of the homestead, to an occupation-road, which has recently been made good by Mr. Bomford at a cost of 1*s.* per cubic yard for burnt clay, which was spread on it to a depth of about 1 foot thick, so that 1 cubic yard would suffice for a running yard on a road 9 feet wide. The cost of the burnt clay per cubic yard comprised 5½*d.* for coal and 6½*d.* for burning.

Bordering this road is a large field, termed the Big Ground; and the remaining closes, whose descriptions follow, are met with in succession until the boundary of the farm is reached.

Big Ground.—This field already merits its name by measuring about fifty-four acres, which were formerly allotted to four fields, namely, (1) twenty-two acres; (2) seven acres; (3) thirteen acres; and (4) twelve acres.

(1.) Of the 22 acres comprised in this portion, 14 acres were in peas in 1864, and 8 in winter beans; but neither of them are worth mentioning, except as an indication of the general condition of the farm. The former yielded an extremely bad crop, and the latter, having failed entirely, were sown with vetches, which, with an additional and spontaneous crop of wild oats, were fed off by sheep. In the autumn it was drilled with wheat, upon which seeds were sown the following spring, and burst up in June, 1866. In 1867 it was wheat again; in 1868 partly mangolds and partly turnips, which proved a failure in consequence of the ravages of a grub; and this year it is again wheat.

* Seeds have been sown upon beans on a few other occasions.

(2.) In 1864 this 7-acre piece was one-year seeds, which were grazed in the summer and afterwards sown with wheat, harvested in 1865. The succeeding crop was beans, followed by wheat sown in the autumn of 1866. In the spring of 1867 this was top-dressed with $2\frac{1}{2}$ cwt. of guano, and after harvest the land was sown with winter vetches, which were eaten off by sheep in 1868. At the present time it is again wheat.

(3.) Mr. Bomford entered upon the occupation of this in the spring of 1864, instead of at Michaelmas. He found it a bare fallow, in so foul a condition that he considered it best to let it remain so that year and thoroughly clean it. So foul was it that the first operation was reduced to mowing the twitch and afterwards burning it; the land was then steam-cultivated, but it was found necessary to take two legs out of the implement in consequence of the heaviness and foulness of the land. In the spring of 1865 it was sown with barley, which received a dressing of guano after it had been laid down with seeds, which were grazed in 1866. In 1867 it was wheat, in 1868 peas (some artificial manure having been given), and this year it is again wheat.

(4.) This portion, consisting of 12 acres, was vetches in 1864; these were eaten off by sheep and sown with wheat, which formed the crop of 1865. The wheat was laid down with seeds in the spring of that year, and these were grazed in 1866 until the beginning of July, when they were burst up by the cultivator. In 1867 the crop was wheat, in 1868 peas, and this year is wheat again.

Crookburn Field.—This is about 16 acres in extent, and has required a great deal of improving. In 1864 it was one-year old seeds, which were allowed to remain until the next year, when the field was drained and the seeds ploughed up. In 1866 it was peas, in 1867 wheat, in 1868 vetches fed off by sheep, and this year it is again wheat.

Hill Ground.—At the present time this consists of 80 acres, but originally it was in five pieces, and some of it so foul that in 1865 it was found necessary to burn it, for neither plough nor cultivator could do anything with it. The result of this burning has been so remarkable that Mr. Bomford wishes that he had been induced to treat more of the farm in the same manner.

The first part of this, comprising 25 acres, was one-year seeds in 1864, but very foul and bad. At Midsummer, they were broken up by two steam-cultivatings, in 1865 it was wheat, in 1866 vetches followed by rape, in 1867 wheat laid down with seeds, remaining in 1868 mixed seeds, which were broken up at Midsummer, and in 1869 it is again wheat.

The second part, about 18 acres in extent, bore a very bad

and foul crop of wheat in 1864, being mixed seeds in 1865. These were broken up at Midsummer and the land sown with wheat in the autumn; in 1867 it was peas, and in 1868 was again wheat, which was top-dressed with the usual mixture of artificials and produced a wonderful crop. This year it is barley, and after harvest it will be manured for vetches.

The third part, measuring about 14 acres, was in 1864 barley, which had succeeded wheat, and in 1865 was mixed seeds, treated as usual. Since then it has been cropped as the preceding portion.

The fourth and fifth parts, comprising 15 and 7 acres respectively, were wheat in 1864, half vetches and half seeds in 1865, and have since been treated in the same manner as parts 2 and 3.

Holloway.—At present this close measures about 25 acres, but in 1864 it consisted of two fields of 16 and 9 acres respectively.

The sixteen-acre piece was wheat in 1864 and seeds in 1865. In 1866 it was sown partly with peas and partly with mangolds, and the courses of cropping since pursued are the following:—

After Peas.	After Mangold.
1867, barley.	1867, wheat.
1868, barley.	1868, barley.
1869, seeds.	1869, seeds.

The seeds will be broken up as usual at Midsummer and sown with wheat. The cross-cropping just mentioned was caused, firstly, by the wet summer of 1867, and secondly, by the necessity of draining.

The other portion of "Holloway" bore a crop of oats in 1864 and mixed seeds the next year. These were broken up at Midsummer but not cleaned, and succeeded by vetches, which again were not cleaned; in 1867 the piece was vetches again, which were fallowed and sown with wheat; and this year it is in winter-beans.

The Grove, 200 Acres.

Mr. Bomford took possession of this farm in February, 1868, paying for the work which had been done since the previous Michaelmas, from which date his tenantcy really commences. It was in a bad state when he took it, and seems up to that time to have sustained its ancient reputation, which gave to it the appellation of "Starve All," by which name it is distinguished on the Ordnance Map. In describing the operations which have been carried out on this farm, we shall follow the plan pursued in the case of Tilesford, merely calling attention to the fact that

the processes of draining and cleaning, which are almost finished at Tilesford, are in full swing here.

Commencing with the arable land, we have :—

Grove Ground.—This consisted last year of two fields, of 14 and 5 acres respectively, the former portion of which bore a crop of wheat in 1867. In the autumn it was horse-ploughed by the previous occupier, and in the spring it was planted with vetches by Mr. Bomford. These were eaten off by sheep, with an allowance of corn; the land was afterwards steam-ploughed once, and this year is wheat, which looked remarkably well in the spring.

The remaining portion was last year two year old seeds, chiefly ryegrass. These were horse-ploughed in the summer, and the land is now wheat, like the rest. No manure has been applied to either portion, and the prevalence of coltsfoot in the latter shows the work which remains for the steam-plough.

Big Ground.—This field now measures 26 acres, of which 15 acres were two year old ryegrass in 1867, allowed to remain in 1868; in 1868, 4 acres were vetches after these two-year-old seeds; and 7 acres were wheat, also after the same seeds. Last autumn the whole piece was sown with wheat, which received in the spring a top-dressing of 2 cwts. of guano and 1 cwt. of nitrate of soda. This year, therefore, we have :—

1. Wheat after ryegrass.
2. Wheat after vetches.
3. Wheat after wheat.

Of the three, the first portion certainly looked the worst at the end of last April, the other two pieces looking very much alike, although the vetches had been fed off by sheep, and the wheat after them might, therefore, be expected to look much better than after wheat itself; but at the time we saw this field the third part was certainly the most luxuriant in foliage. What the result will be in corn Mr. Bomford has promised to let me know eventually.

Clarke's Field (7 acres) was wheat in 1868, and is now spring vetches. *Grave Ditch* (20 acres) was in 1868 beans after oats; this year it is mixed seeds, which had been sown in the beans, and will be broken up at Midsummer. *Smoke Pear Tree* (9 acres) was wheat upon seeds in 1868, and is now peas.

Landman's Rail.—This piece measures 16 acres. In 1868 it was barley after wheat, and is now seeds; the barley was dressed with 3 cwt. of guano and superphosphate, and the seeds with $\frac{3}{4}$ cwt. each of nitrate of soda and guano. From 6 to 7 acres of the field had been pipe-drained a few years ago at a depth of

about 24 inches from the bottom of the furrows, and the rest was drained in 1868, before the barley was sown, at least 1 foot deeper. The difference in the seeds in the two portions was very prominent, the boundary-line being sharp and distinct, and the comparison very much in favour of the deeper draining. These seeds will be eaten off and the land fallowed for wheat.

Woodcock's Ground.—At present it comprises 45 acres, but two years ago it was in four fields. The first portion, measuring 22 acres, is barley following wheat. The second part, a small piece of 4 acres, is mangolds after wheat, and has been dressed with 100 yards per acre of burnt soil from the hedgerows, as well as with 4 cwt. per acre of artificial manure. The third part, 12 acres, was a poor pasture, but it has been broken up, and is this year sown with oats. The fourth portion comprises 7 acres, and has received a special treatment. The land was very foul, and required a thorough cleaning and cultivating. The first step taken was to sow it with spring vetches; these have been dressed with $1\frac{1}{2}$ cwt. of guano per acre, and will be eaten off by sheep. The sheep having eaten off the crop and well trodden the land, it will be broken up by the steam-cultivator, and 100 yards of burnt soil per acre will then be put on. The crop of vetches will not pay for sowing and dressing, except as a cheap means of enabling the land to be thoroughly cleaned, as weeds die in the clods that are turned up by the cultivator if the ground has been well trodden; and the most important question here was, how to clean so foul a bit of land.

The *Wey Leys* and the *Five Leys* comprise about 14 acres of poor grass, which have just been drained preparatory to being broken up and thrown into Woodcock's Ground.

The *Long Ground*, of 16 acres, has been in pasture for the last thirty years; but it will also be broken up and the hedges stubbed. It has been thoroughly drained this spring, and is now ready to be cast down by horse-ploughing.

The remainder of the farm is either old pasture or meadow.

7.—*Bulbridge and Ugford, near Salisbury; in the occupation of* Mr. James Rawlence.

These farms occupy a strip of land situated on the north and south slopes of the valley of the Nadder; the sole of the valley, which consists entirely of water-meadows at this point, forming a kind of neutral ground between the two. The farms are about $2\frac{1}{2}$ miles in length, from north to south, and the greatest width, across the water-meadows, is about one mile. The eastern boundary is

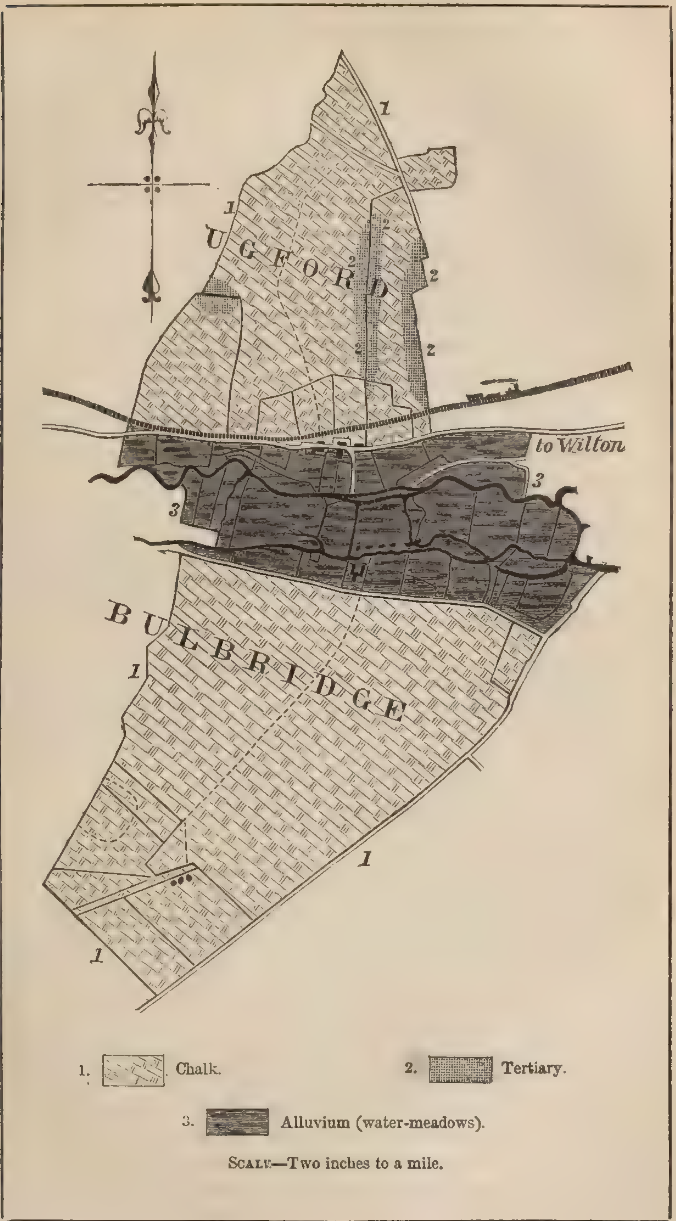
four miles from Salisbury, and half a mile from Wilton, and the western margin is a little more than a mile from Barford St. Martin. The two farms measure 955 acres, about 750 of which are arable land, 106 water-meadow, 70 pasture, and the remainder orchards, &c. The Ugford farm occupies the strip of land on the northern side of the valley, and consists of 320 acres of arable land. Bulbridge, on the opposite side of the river, contains 434 acres of land under tillage.

The soils require very brief description, as they rest almost entirely on chalk; they may, indeed, be regarded as thin chalky soils, especially thin and chalky on the higher land, and graduating into deeper and richer soil, of an alluvial character, towards the water-meadows in the lower ground. At Ugford there are, however, some exceptional patches of trifling extent, which consist of stronger and better land resting on tertiary outliers, as shown in the map.

The fences need not be particularly described, for the arable land is both enclosed and subdivided by hurdles and wattle-fencing, costing about 60*l.* per annum for repairs and renewal. The only live fences on the farm are those which divide and surround the pastures and meadows.

Out of 750 acres of arable land scarcely more than 400 are annually devoted entirely to green crops, in addition to the 100 acres of water-meadow and 31 acres of available pasture. The remaining 36 acres of pasture, being covered with gorse, are of little use, and need not be considered. On this land Mr. Rawlence keeps his flock of 876 breeding ewes, besides a few dry ones; and last season he wintered 406 teggs (being 386 ewe-teggs, and 20 ram-teggs) and 15 older rams, making altogether about 1300 sheep. Last spring at the time of our visit (May) he had over a thousand lambs. The number of sheep wintered would be immensely increased, and the whole system of farming overturned, but for the fact that Mr. Rawlence sells all his wethers as *lambs* in August, and also either sells or lets his ram-lambs about the same time. With the trifling exceptions just mentioned, the whole of the sheep wintered on the farm are, therefore, either breeding ewes or ewe-teggs. In addition to the sheep, the farm supports a dairy establishment consisting of 35 dairy cows, 22 heifers (2 and 3 years old), and 10 yearlings. During some portion of the year, however, as we shall presently see, certain of the sheep are sent to the Downs, and some of the cattle to a park. In consequence of the large number of sheep kept on the farms, the white crops are, as a rule, unusually heavy for the character of the soil, which is by no means remarkable for its natural fertility.

Fig. 1.—*Geological Map of Bulbridge and Ugford, near Salisbury.*



Bulbridge.

I. Home Arable.—84 acres.

1. Wheat.

2. Barley.

3*a*. Broad clover (mown). — 3*b*. Italian rye-grass, followed by swedes.

4*a*. Broad clover (fed), followed by rape and turnips. — 4*b*. Mangolds or cabbages.

Returning again to Wheat.

II. Field Arable.—316 acres.

1. Wheat.

2*a*. Barley. — 2*b*. Swedes or rape and turnips, the latter preceded by vetches and winter oats on the wheat stubble.

3*a*. Sainfoin. — 3*b*. Barley.

4*a*. Sainfoin. — 4*b*. Seeds (mown).

5*a*. Sainfoin. — 5*b*. Seeds (fed), one-half followed by rape and turnips.

Returning again to Wheat.

III. Down Arable.—34 acres.

This land was broken up out of gorse and brushwood 12 years ago. It is too weak for ordinary crops, so it is farmed on a two-course system, each half being alternately "dredge" and "roots." The "dredge" consists of 3 bushels of oats, 1 bushel of barley, ½ bushel of beans, and ½ bushel of peas; and the roots are one-half mangolds and one-half swedes, drilled after the land has been steam-cultivated, and dressed with 50 bushels per acre of road scrapings and town refuse, and 8 bushels of dissolved bones; the mangolds sometimes also getting a top-dressing of 1 cwt. of guano and 2 cwt. of salt. All the roots are fed off on the land by sheep, which get at the same time an allowance of corn or cake.

UGFORD FARM.—300 acres.

This includes some of the best land farmed by Mr. Rawlence; 200 acres of it are farmed on the same four-course system as the Home Arable at Bulbridge, and the remainder on the Norfolk four-course system, certain "catch crops" being taken previous to the root-course, and half the barley-land being sown with mangolds or cabbages instead of seeds. It must, however, be understood that no particular hundred acres are constantly devoted to the latter system, but that each portion of land is in turn farmed on both systems. The Norfolk four-course for this 100 acres may be tabulated as follows:—

1*a*. Wheat and rye-grass. | 1*b*. Wheat followed by vetches and winter oats.

2*a*. Italian rye-grass followed by swedes. | 2*b*. Turnips.

3. Barley.

4*a*. Mixed seeds. | 4*b*. Mangolds or cabbages.

Wheat as above.

The remaining 20 acres of arable land on this farm are in five small fields, about one-half the quantity being in roots every year and the remainder in white crop.

On the whole farm the quantity of land in white crop every year will, if calculated up, be found to be—

	Acres.
1. On the home arable at Bulbridge, one-half the area, viz.	42
2. On the field arable at Bulbridge, two-fifths the area, viz.	128
3. On the down arable at Bulbridge, one-half the area, viz.	17
4. On the Ugford Farm, one-half the area, viz.	150
5. On the small fields, one-half the area, viz.	10
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GRASS-LAND.

Water-Meadows.—The portion intended for early spring feeding is irrigated in November, the remaining sections being watered in succession as the water can be spared, and the irrigation of the last meadow commencing about 20th of December; irrigation is continued during the winter until a week or ten days previous to each meadow being stocked in the spring. Sheep begin to feed the first portion of the meadows about March 20th, and continue to feed off in succession the remaining divisions,

with the exception of one reserved for the dairy cows. As soon as the sheep have fed off each section it is again irrigated, and when ready is mown. The aftermath is invariably fed by the dairy cows and young stock, as it is not sound for sheep.

The "drowner," as the man who looks after the irrigating is here termed, is paid 5*s.* 6*d.* per acre per annum for attending to the irrigation during the year, and "taking up" the carriers and drains; in other words, cleaning them out. Generally he is assisted by another man, and between them most of this work is done as overtime. Mowing costs about 3*s.* 6*d.* per acre and a gallon of cider.

Pastures.—The pasture land is devoted entirely to the dairy cows and young stock, and is manured with road-scrapings, compost, and liquid manure.

Arable Land.

1. *Wheat.*—Immediately before the seeds are broken up the land receives a dressing of 15 two-horse loads of farmyard-manure per acre; but the land after turnips is not manured, having been manured for the root-crop. Generally the preparation for wheat is limited to one ploughing, which is done as soon as possible, commencing about the beginning of October. Wheat-sowing commences, on the five-course portion of the farm, in October with $2\frac{1}{2}$ bushels of seed per acre, and finishes in January with about 3 bushels. On the four-field part of the Bulbridge farm wheat sowing commences with 2 bushels of seed per acre, generally in October, and ends as in the previous system. The earlier sown seed consists of two-thirds Browick red wheat and one-third of a white sort; and the later portion in both systems is sown with Nursery wheat. The seed is drilled in rows 8 inches apart with a Suffolk drill, and in spring the land is horse-hoed, the light chalky brows being top-dressed with a mixture of $1\frac{1}{2}$ cwt. of guano, $\frac{1}{2}$ cwt. of nitrate of soda, and 2 cwt. of salt.

Harvesting is done partly by machine, and partly by hand. When done by hand the cost of mowing and sheafing varies from 9*s.* to 12*s.* per acre, according to the crop, the men finding their own beer or cider. Carting and stacking are done by day-work; thatching (which includes nothing but the bare operation) is done at $4\frac{1}{2}$*d.* per square. Threshing is done by steam-machinery, the men being paid by the day.

2. *Barley.*—Barley is taken either after wheat or after roots, and as the modes of treatment in the two cases are somewhat different, it will be better to notice them separately.

(*a*) *After Wheat.*—As soon as the wheat has been carted the

land is steam-cultivated once or twice, as may be necessary to thoroughly clean it. About November it is horse-ploughed; and as soon as the frost has broken up and the land is dry enough in the spring, it is lightly scarified either by horse or steam-power, harrowed and rolled, and drilled with 12 pecks of Chevalier barley per acre. Generally it is top-dressed with 1½ cwt. of guano and 2 cwt. of salt per acre. Mowing is paid for at the rate of from 2*s*. or 3*s*. per acre, and "pooking" at the rate of 1*s*. per acre, the usual allowance of cider being given in addition. On this farm barley is never sheafed.

(*b*) *After Turnips.*—As soon as the turnips have been fed off the land is ploughed once; and if the weather has been dry while the sheep have been on the land, it is dressed simply by harrowing and rolling; but if wet weather has prevailed, and the land has been made stiff, it receives a light scarifying in addition to the other preparation. Twelve pecks of seed per acre are drilled after turnips, and no top-dressing is given, otherwise the treatment of barley in this course is identical with that of barley after wheat.

3. *Seeds.*—The barley succeeding wheat, and half that succeeding roots on the four-course systems, is horse-hoed once; and then more than half of it is sown by means of a seed-barrow with 12 lbs. of red clover and 4 lbs. of white Dutch per acre; and the remainder is sown either broadcast or by the barrow, with 2 bushels of Italian rye-grass. The former is mown the first year, and the aftermath eaten off; it is fed off the next year by the 20th of June, the dung-cart following the fold, and the land ploughed immediately for rape and turnips, to be followed by wheat. The Italian rye-grass is folded off by sheep from the water-meadows, and is got rid of by the 20th of May, when the land is immediately prepared for swedes.

The barley following roots in the five-course system (32 acres) is sown with the same mixture of red clover and white Dutch as that just mentioned, and the seeds are treated in the same manner, except that one-half of this course, instead of being fed off by the end of May, and followed by rape and turnips, is not folded off until the end of October, and is succeeded immediately by wheat.

The barley following wheat in the five-course system (32 acres) is laid down with 5 bushels of sainfoin, 6 lbs. of trefoil, and 4 lbs. of white Dutch clover per acre. This is lightly fed by ewe lambs after the barley is cut, and it remains down for the next three years. As a rule, it is cut two years, and entirely fed either the first or the third year, but generally the first. In this case, after being cut in the second year, it would be fed after the scythe; and the third year it would be cut first, then folded

twice, and immediately cart-dunged, ploughed, pressed, and sown with wheat. The cost of mowing either clover or sainfoin is from 2*s.* to 3*s.* per acre, with the usual allowance of cider.

4. *Roots.*—Under this head we have a very complicated series of crops to describe, as they form part of so many systems. It will probably be conducive to clearness if we describe them in the following order:—

(*a.*) Rape and Turnips after mixed seeds, fed the second year.
(*b.*) Swedes after Italian Rye-grass.
(*c.*) Swedes after Wheat.
(*d.*) Turnips after Green Crop on a Wheat Stubble.
(*e.*) Mangolds after Swedes and after Barley.
(*f.*) Cabbages instead of Mangolds.

(*a.*) *Rape and Turnips after Mixed Seeds.*—The two-year seeds are folded off until about June 20th, and are then cart-dunged with from 12 to 15 two-horse loads per acre, and ploughed once; the land is then harrowed and drilled with about a sack of dissolved bones mixed with compost, and with 1 lb. of rape, and 2 lbs. of turnips. When the plants are fit they are horse and hand-hoed, and the crop is fed off as soon as ready.

(*b.*) *Swedes after Italian Rye-grass.*—This course occurs in both the four-course shifts, the rye-grass in one case having been sown on wheat, and in the other on barley. The sheep from the water-meadows are folded on the rye-grass, which they finish by about the 20th of May. The land is immediately afterwards ploughed once, harrowed, and the seed drilled, with about one quarter of dissolved bones mixed with about 50 bushels of compost per acre, in drills 19½ inches apart. Mr. Rawlence now drills swedes entirely on the flat, but in former days he practised the ridge system. When ready the plants are horse-hoed twice, and they also get two hand-hoeings and a singling, to about 9 inches apart, at a cost of from 8*s.* to 10*s.* per acre, the singling being done by the hoe. Nearly the whole of this crop is fed off on the land, the exception being that one-third of the swedes grown on the "Home arable," at Bulbridge, are carted off and given to the dairy-stock in the yards; but this quantity does not amount to more than the produce of 3½ acres per annum.

(*c.*) *Swedes after Wheat.*—This crop is taken on nearly 20 acres every year in the five-field shift on the "Field arable" at Bulbridge. The autumn cultivation of the land commences in November, and continues into the winter until the month of January. During this period the wheat-stubble is steam-cultivated once or twice, as may be required, and ploughed once.

In the spring it is again scarified, either by horse or steam, according to circumstances, harrowed and drilled, as already described, for "swedes after Italian rye-grass," and subsequently receives the same treatment, the whole of the crop being fed off on the land.

(*d.*) *Rape and Turnips after Green Crop on a Wheat Stubble.*—Instead of a crop of swedes being obtained in the manner just described on the whole of the "half-course," available for it on the five-field shift pursued in the Bulbridge "field arable," 20 acres out of the 40 are sown with vetches and winter oats soon after the wheat is harvested; and this "catch crop" is succeeded by turnips, or by rape and turnips, as soon as that is fed off. The land is ploughed once as soon as possible, and drilled with 3 lbs. of seed and 4 bushels of dissolved bones mixed with 50 bushels of compost per acre, being afterwards treated in the ordinary manner. The same system is pursued on one-half of the shift in the four-field rotation which constitutes the variety in the management of one-third of the Ugford farm.

(*e.*) *Mangolds.*—This crop is not taken on the five-course "field arable" at Bulbridge; but it occupies one-eighth of the area farmed under the four-course systems, namely, 48 acres, and one-fourth of the "down arable," and a portion of the small fields at Ugford, making together about 10 acres. From this total of 58 acres, however, we must deduct the portion annually allotted to cabbages in lieu of mangolds.

The land is manured with 15 two-horse-loads of farmyard manure in the spring; it is ploughed and pressed as soon as the swedes are fed off; except the portion after barley, which is manured in the winter and ploughed immediately, the spring tillage being the same as on the previous portion. The land is then harrowed and drilled with one quarter of dissolved bones and compost, and with 8 lbs. of yellow globe mangold seed per acre, sowing being usually finished by the middle of May. The drills are $19\frac{1}{2}$ inches apart, and the plants, after frequent hoeings by horse and by hand, are left from 9 inches to 1 foot asunder in the rows. About one-third are fed off by sheep in October on the ground, no preference being given in this matter to any description of sheep on the farm. The remainder are taken up, topped, put in long pits with a slight covering of straw under the earth, leaving the top of the ridge uncovered for a short time, until there is no chance of heating, when the ridge is entirely closed by earth. These mangolds are for the most part reserved for the ewes after lambing, and for the draft-ewes, rams, and sale-lambs during the months of June and July.

(*f.*) *Cabbages.*—Cabbages are invariably planted on a portion of the land which would otherwise be devoted to mangolds. Early

York seed is sown in seed-beds in July, and the plants are pricked out, partly in November and partly in February, the land having previously received the same treatment as for mangolds. The rows are 18 inches apart, and the plants the same distance from one another in the row. They are planted opposite one another to allow greater facilities for the two horse-hoeings which they always receive. Subsequently they are hand-hoed twice at a cost of 8*s*. per acre, and the crop is disposed of by being fed off on the land.

Other Green Crops.—Under this head we must mention (*a.*) vetches and winter oats (or beans), and (*b.*) rye and winter oats. The former description of crop is sown on a wheat-stubble in the five-field course, to be followed by rape and turnips instead of swedes, the first sowing being 2 bushels of vetches with ½ bushel of winter oats, and the second the same quantity of vetches with ½ bushel of winter beans. Rye and winter oats are grown merely as a makeshift in the event of rye-grass turning out a failure when sown in its usual place in the four-course shifts. The land is in that case ploughed once, and 3 bushels each of rye and winter oats are sown per acre.

Cattle.

Under this head we have to describe only the management of the dairy stock, which are cross-bred, shorthorn and Alderney, or shorthorn and Devon. There are 35 dairy cows, and generally about a dozen each of 2-year-old heifers, yearlings, and calves. After calving, the cows are fed entirely on cut hay for about six weeks, when they get in addition a daily allowance of 3 lbs. of cotton and rape cake until about the 20th of March; they then go into the water-meadows during the day, being brought up at night and given hay and straw, without artificial food, in the sheds. From April 20th until the end of November they are kept entirely in the water-meadows and pastures. They get the run of 40 acres of spring feed up to haymaking time, after which the whole of the grass-land is stocked by them.

Ten 2-year-old heifers are sent to Longleat Park after bulling, generally remaining there from May 20th to October 20th, at a cost of 2*s*. 6*d*. each per week. The yearlings and calves are kept on the home grass-land during the summer.

In the winter the in-calf heifers, as well as the 2-year-olds and yearlings, get 3 lbs. of cotton and rape cake with cut straw; but the calves are fed on linseed cake, getting a daily allowance of 2 lbs. with a mixture of cut hay and straw. About twelve calves are weaned every year, the remainder being sold as soon as possible.

Butter is made twice a week, and skim cheese every day during the summer.

SHEEP.

Mr. Rawlence is well known as a successful breeder and exhibitor of Hampshire Down Sheep; and it will have been observed that the chief object of his system of farming is to obtain as large a quantity and as continuous a succession of sheep-food as possible.

Nearly 900 ewes are annually put to the ram, the actual number last year being 876. Mr. Rawlence lost the use, for that season, of 14 prize shearling ewes which were shown at Falmouth and Leicester, otherwise his total would have nearly reached the round hundreds. The number of draft-ewes is about 250 annually, and the crop of lambs averages about 5 per cent. more than the ewes put to the ram.

Before describing the details of his sheep management, it will conduce to clearness of comprehension if Mr. Rawlence's ruling principle is first brought into relief. It is simply *frequent change of diet.* As a general system the sheep are provided all the year round with a *day* fold and a *night* retreat, so that the appetite is continually whetted by variety.

The ewes are put to the ram in August, either on the aftermath of second-shear clover, or on sainfoin, and at night they are folded on the rape and turnips before wheat. The same treatment is pursued until the spring, rape and turnips being fed off in succession, and finally swedes, commencing about the middle of October and continuing until lambing time. As soon as wet weather or white frosts begin, cut hay and straw (about half of each) are given with the roots, and this addition is continued until lambing time. After lambing the ewes get mangolds with hay chaff for about 10 days in the lambing pens; and in addition to this food, the ewes with tup-lambs or with couples get either 1 pint of oats or 1 lb. of cake; but unless roots are scarce the remaining ewes are denied artificial food. At the expiration of 10 days or a fortnight the ewes and lambs go on turnips, those with tups or couples getting the same additional food, and they remain there until March 20th.

About March 20th the ewes and lambs go into the water-meadows by day, and are folded at night on swedes for the first fortnight or so, and afterwards on Italian rye-grass, or occasionally on rye and winter oats, which have been sown where rye-grass has failed. This treatment is continued until the middle of May, when the lambs are weaned. The tup and wether lambs get an allowance of corn or cake as soon as they can eat, which they find access to by means of lamb-gates.

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These lambs are weaned by folding on sainfoin by day and vetches at night; the ewe-lambs clear behind them during the daytime, and run over two-year-old seeds at night, and as a rule they get no corn. About the first week in June the tup and wether lambs begin to get mangolds and cabbages cut up and served in troughs; the rams and wethers are separated, the former being followed by ewe-lambs at Ugford, and the latter by draft ewes at Bulbridge. The details of the management are briefly as follows:—At 5 o'clock in the morning the ram and wether lambs get about 6 oz. of corn or cake on their night-fold, and in half an hour go on to a break of sainfoin; about 11 o'clock they get cabbages and mangolds cut up in troughs, and at 5 in the afternoon they are given another 6 oz. of corn or cake, being sent on vetches for the night half an hour afterwards. About the middle of July, however, rape or cabbages are substituted for vetches. The ewe-lambs follow the ram-lambs until the wethers are sold, after which they run on the aftermath seeds in the daytime, and at night are folded on rape and turnips preceding wheat. They get no corn or cake, and are followed according to the system by the breeding ewes. The draft ewes, when dry, follow the wether lambs, and get ½ lb. of corn or cake per diem until they are sold, which is usually in July or August. As a rule the wether lambs are sold on August 12th, but occasionally earlier. Their average weight is 16 lbs. per quarter, but individual cases of 20 lbs. have sometimes been recorded; and the average price for the last 5 years is 36*s.* per head.

About 140 ram-lambs and 20 older sheep are sold or let every year, the average price obtained during a series of years being 11 guineas.

The ewe-teggs not introduced into the breeding flock are wintered on the thin hill-land at Bulbridge, on mangolds and swedes, getting ½ lb. of cotton- or rape-cake per day with hay and straw chaff; this treatment is continued until the middle of April, when they are folded in the water-meadows by day, and on Italian rye-grass behind the couples at night, until May 20th. From this date until August 1st they are kept on a down at a cost of 2*d.* each per week, being folded on bare fallow at night.

Sheep are washed in the river, about 10 days before shearing, by the ordinary farm labourers, who are paid their usual wages, but get in addition 3 meals a day and an allowance of cider. Shearing is done by a travelling company at 15*s.* per hundred, wool-winders and helpers being found by Mr. Rawlence. No drink is given, except 1 quart of strong beer per man at night for supper. The fleeces of teggs weigh about 6 lbs., and of the ewes about 5 lbs. Sheep are dipped, about the end of August or beginning of September, in a solution of arsenic and soft soap,

by a travelling company at a cost of 1*s.* 8*d.* per score, including the materials, helpers being found as for shearing.

Horses.

Notwithstanding the lightness of the land, the adoption of steam cultivating machinery has left its mark by causing a considerable reduction in the number of horses kept on the farm. Formerly 22 horses were found none too many, now 17 can perform all the work left for horse-power. This reduction is nearly 25 per cent.; and as the tillage land measures 750 acres, it is equal to one horse to every 150 acres.

In winter each horse has a weekly allowance of 1½ bushels of oats, ½ bushel of beans or maize, and 1 bushel of bran, with a certain quantity of wheat chaff, crude straw being at the same time given in the racks. From the beginning of March until May the allowance is increased by the addition of 56 lbs. of hay per horse; and when green food comes in the quantity of corn is reduced to one-half. In the summer the horses are turned out to grass for about a month.

The stables are not subdivided into stalls, but the whole of the horses stand side by side. They are bought young according to circumstances, from suckling foals to three-year-olds; and, as a general rule, none are bred on the farm.

Artificial Manures.

The artificial manure used for roots for the most part consists of dissolved bones and compost prepared on the farm. During the winter, in wet days, when very little other employment can be found for some of the labourers, they become very busy in soaking half-inch bones with liquid manure from the tank. Three heaps of bones are made, each containing 2 quarters; these are soaked for about 3 days with as much liquid manure as they will absorb. When thoroughly saturated, one of these heaps will be put into a cauldron for further treatment, and a new one is made and saturated to supply its place in rotation. The *oldest* heap, therefore, always stands next for treatment in the cauldron, which is done as follows:—The 2 quarters of bones are shovelled into an old cauldron, and at the same time mixed with about 50 lbs. of sulphuric acid per sack, the acid being added from time to time as more bones are put in. The mixture remains for about 24 hours, when it is taken out and thoroughly mixed, in a heap, with an equal quantity of undissolved half-inch bones. The heap thus remains until about 2 or 3 weeks before it is wanted, when it is mixed with about 50 bushels of compost per quarter, which quantity then

forms the dressing for 1 acre of swedes or mangolds, or for 2 acres of common turnips or rape.

Farmyard manure is put on the land direct from the yards whenever it is practicable; the remainder is drawn into fields and carted over.

LABOUR.

All the labour on the farm is done by day-work, with the exceptions of steam-cultivating, harvesting, and turnip-hoeing, and the total cost of labour on the farm comes to about 30*s.* per acre on the whole extent of the occupation.

The wages of ordinary labourers are 10*s.* per week, with a free allotment of 10 lug of manured and tilled potato-ground; and they are allowed to rent a cottage and garden at 1*s.* per week. Shepherds and carters get 12*s.* per week, an extra payment of 3*l.* 10*s.* at Michaelmas, a cottage and garden rent-free, and the privilege of buying 10 score of bacon per annum at 2*s.* 6*d.* per score below market price. In addition to this the shepherds are allowed 15 lug each of manured and tilled potato-ground instead of 10. Under-carters and under-shepherds get from 7*s.* to 9*s.* per week, with lodgings rent-free, and fuel; they are also paid an additional allowance of about 35*s.* at Michaelmas, and they each have an allotment of 6 lug of potato-ground. The wages of boys vary from 2*s.* 6*d.* to 5*s.* per week, with an addition of from 5*s.* to 15*s.* at Michaelmas. Women are employed in weeding and other light work at from 8*d.* to 10*d.* per diem, getting 1*s.* per day at harvest-work.

XVII.—*Report on the Exhibition of Live Stock at Manchester.* By W. WELLS, M.P., Senior Steward.

THE Exhibition of the Royal Agricultural Society this year has been most successful, and worthy of the great city where it was held.

As soon as Manchester, out of several keenly competing towns, was fixed upon as the scene of action for 1869, it was felt that every effort must be made to render the visit there a memorable one. The occasion required it. Not only was it to be the first visit to the metropolis of the manufacturing districts, but the Society was to come there with his Royal Highness the Prince of Wales as its President, while a hope was entertained, now happily fulfilled, that the Princess of Wales would graciously consent to be present also.

The efforts of the Society were warmly seconded by the Local

Committee; and to the energy and liberality displayed by the very hard-working members of that Committee, no small measure of the success of the Exhibition is due.

The financial details of the Meeting will be found elsewhere, but it may be interesting to compare the numbers of persons admitted, and the corresponding amount received, at the three great towns—centres of densely populated districts—Leeds, Newcastle, and Manchester respectively. They are as follows:—

	No. of Admissions.	Amount received. £.
Leeds	145,738	9,889
Newcastle	144,683	8,045
Manchester	200,733	17,059

The entries of Stock at the three towns were as follows:—

	Cattle.	Horses.	Sheep.	Pigs.	Total.
Leeds	295	132	345	115	887
Newcastle	302	82	328	135	842
Manchester	336	384	464	131	1315

This great increase in the number of entries was made up by a very general addition to the numbers in most of the classes although the increase was, perhaps, most marked in those o the horses. Even last year at Leicester, where, as migh have been expected, the number of horses shown was large than common, there were only 167 entries against 384 a Manchester.

Of these 384 it is satisfactory to record that 131, or as many as were comprised in all the horse classes together at Leeds, were entries in the agricultural or dray-horse classes.

In the various classes for hunting mares and geldings there was a keen competition for the very liberal prizes offered by the Local Committee; and some of the "Hunters"—a name little appropriate to not a few of them—were put through a further ordeal in an enclosure adjoining the Society's Show-yard, where other and separate prizes were given by the Local Committee to the successful competitors in jumping over hurdles and water.

This performance, to see which a separate entrance was made, and separate entrance-fee charged, proved to be very attractive, and was a means by which some of the heavy expense to which they had been put was recovered by the Local Committee.

Notwithstanding, however, the financial success which attended this exhibition of horse jumping, it is very questionable whether it is advisable for the Royal Agricultural Society to allow the same thing another time. It was impossible at Manchester, and would always be impossible, to make the public understand that

the Society had nothing whatever to do with the proceedings; and it leaves the Council open to the charge of encouraging, for the mere sake of money making, what after all partakes more of the nature of a circus, than of any part of an Agricultural Society's Show.

Horses entered for the Society's prizes are no longer required to undergo a preliminary veterinary examination, although it is competent for the Judges to call for the assistance of the Veterinary Surgeons if they consider it expedient to have any horse examined. This alteration of the old rule was not attended, so far as could be seen, by any disadvantages, but it will be necessary to watch the effect of it very narrowly, especially with respect to stallions and brood mares, as by the award of prizes and commendations to animals unsound, or having hereditary diseases, the Society might do irreparable mischief.

The Reports of the Judges of Stock are given in most cases at length; as the opinions of the persons deliberately chosen by the Society to make their awards are of material importance, and are read with great interest.

The Judges of horses for agricultural purposes send in very meagre Reports, hardly, perhaps, doing justice to the importance of the classes under their adjudication.

The Report of one of the Judges merely says—

In several classes, numbers very short, and not satisfactory. The dray, or working horse classes very good generally. The first class, of entire horses, satisfactory.

Another Report says—

Class 1 and Class 2 good, particularly the horses to which the prizes were awarded.
" 5. Good, but not much competition.
" 6. Only one shown.
" 25 and 26. Tolerably good.
" 28. Passable, but short in numbers.
" 29. Very good indeed.
" 30. Good, but not much competition.
" 31. Only one shown.
" 32. Well represented.
" 33. Good, but short in number.
" 34. Only one shown.
" 35. Very good; a pair of the best dray horses I ever saw.
" 36. Good, especially the first prize animal.
" 37. All the animals good in this class.
" 38. The prizes horses very good indeed.
" 39. Very well represented, good animals altogether.

I consider the show at Manchester the best for all sorts of horses I ever saw.

There were 79 entries, in all, in the agricultural horse classes. In some, therefore, as there were 20 classes, the entries were

disappointing as regarded number. This was chiefly the case in the Clydesdale and Suffolk classes. In the former there were only 14 entries to contend for prizes amounting in the whole to 130*l*., and in the latter there were 27 entries, to contend for prizes amounting to an aggregate of 165*l*.

In the class for agricultural stallions foaled before January, 1867, Mr. Welcher's first-prize horse, "Honest Tom," was conspicuously the best animal, and deserved his honours even more than he did at Leicester. He has greatly improved since then, and grown into a fine specimen of a "Shire" cart-horse stallion.

The Clydesdales only made one think with vain longing for such another show of their class as we had at Battersea. Many horses of this breed, belonging to Scotch owners, were probably kept away for the Edinburgh Show, which followed so closely upon Manchester; of which Show a report since published says —"The collection of Clydesdale horses here, we have scarcely ever seen surpassed."

Among the 14 Suffolks shown, there were a few valuable animals. The only 2-year-old stallion entry was a beautiful symmetrical horse; and one of the best, if not the best looking among the mares and fillies, belonging to Mr. Wilson, of Baylham Hall, was the only entry, and prize-winner, in class 34.

A supplementary note from the Judges calls attention to the great excellence of the dray-horses shown; they say—"The dray-horses were wonderful indeed, we do not hesitate to say they were the best we have ever seen shown."

Of the classes embracing thorough-bred stallions, mares suitable for breeding hunters, heavy-weight and light-weight hunters, &c., the joint Report of the three Judges is as follows:—

Class 7. Thoroughbred Stallion, suitable for getting Hunters.—This class, with the exception of four or five horses, we considered but moderate. "Carbineer," "Motley," and "Laughing Stock," being decidedly the best. Of the remainder, some were deficient in quality, and some in action or soundness.

Class 11. Mare in Foal, or with Foal at foot, suitable for breeding Hunters. —A good class, both in merit and numbers.

Class 12. Hunter (Mare or Gelding) over 4 years old, up to not less than fourteen stone.—This class we considered of more than average merit, fairly representing the weight-carrying hunters.

Class 13. Hunter, Gelding; 4 years old.—An excellent class, the first three of high quality.

Class 14. Hunter Mare, 4 years old.—A very indifferent lot.

Class 15. Hunter (Mare or Gelding), 3 years old.—This class does not call for any comment, being of average merit.

In conclusion, we would call your attention to the necessity of recommending breeders of hunters to select sires with quality, soundness, and true action, whose past history warrants them in believing they will transmit to their progeny the endurance they themselves possessed, and to reject the heavy, lumbering sire, whose turf career has been a miserable failure.

It will be remarked that in this joint Report of the Judges,

class 16 is not mentioned. In a separate Report, sent in by one of them, the following remarks on it are made:—

Class 16. Hunter (Mare or Gelding), not less than 4 years old, up to not less than twelve stones.—There were twenty-eight entries, but not many first-class animals. "Brian Boru" was far away the most valuable horse; he is a fine goer, and would have been more properly placed in Class 12. "Terrona" is a taking looking horse, and has, we hear, been a frequent winner, but he does not go so well as he looks, and his shoulders are not nicely placed.

There can be little doubt that the opinion here expressed is a right one, amply confirmed by the tenour of the remarks made by the public. The class was a very indifferent one. Where there was evidence of good breeding, there was a distressing absence of action, and where there was good action, there was a deficiency of breeding.

The special prize of 30*l.*, given by the Manchester Local Committee to the best hunter in any of the "hunter" classes, was awarded to Sir George Cholmley's chestnut gelding "Don Juan," the winner of the first prize in class 13. Major Barlow's brown gelding, "Topstoll," was second in merit for this prize, in the opinion of the Judges; and it must have cost them, one would think, no little trouble in coming to their decision.

It would be right to add that in the separate Report alluded to above, several points are brought out, which are not contained in the joint Report of the Judges. For instance, taking the 7th and 11th classes together, it is remarked that, in the opinion of the writer, the Society has never brought together so many mares and stallions likely to be of service to the country.

Class 13 is hardly spoken of in as high terms as in the joint Report, although the winner "Don Juan" is warmly praised, as a "very stylish improving colt, nearly, if not quite, thorough-bred, and likely to make a first-class hunter." He was placed second as a 2-year-old at Thirsk, and first as a 3-year-old at Wetherby.

Of the remaining classes, consisting of stallions for getting hackneys; stallions for getting coach-horses; mares for breeding hackneys; roadsters; harness-horses; ponies, &c., the following is the Judges' Report:—

We commenced our work with Class 8, for hackney stallions, and were soon able to select three good-looking horses from which to choose the 1st Prize, No. 78. Mr. Tuffit's "Fire-away," though minus an eye from an accident, we placed first, finding him a more compact horse, and truer in his action, than No. 75, Mr. Dent's "Ambition," who, though a fine goer, rather fights and dishes. The rest are only moderate specimens of their class.

Class 9. Stallion for getting Coach-Horses.—No. 97, "Young Eton," was clearly the finest horse as a carriage-horse in the class, and we placed him first. "Octavian," No. 89, is also a good coach-horse, and will be better, being only three years old; and third, but not the most unlikely of the three to get

good harness horses, the "Hadji," No. 95, who, though showing light alongside the two best horses, has both quality and action.

Class 10, for Pony Stallions, was decidedly inferior, and No. 103, "Tom Sayers," was easily the winner.

Class 17 contained some useful squary sort of Mares, but were all of them deficient in quality, and would require to be put to a thorough-bred horse to produce a gentleman's hack; the first-prize mare was a long way the best, No. 229, Mr. Cook's "British Queen."

Class 18 had only one pair of carriage-horses, which we thought worthy of the first prize.

Class 19. One entry, a Mare.—Very irritable, and we did not consider her entitled to the first prize, and, therefore, presented her with the blue rosette.

Class 20 was only small, but showed us two promising colts, No. 239, the first-prize horse, being exceedingly handsome, and No. 240 also a very promising colt.

Class 21 was both a large and a good one, and it took us some time to place the winner. We found it a difficult matter to decide between Nos. 246 and 250, as they were both excellent goers, but the old mare showed both fine quality and superb action, and received the first prize. No. 254, Mr. Murray's "Perfection," is a remarkably clean-shaped one, and also a good goer, and has the reserved number.

Class 22 was well represented, but there was nothing of extraordinary merit. No. 270, the first prize, a neat, strong pony, and No. 275, a clever chestnut, being in our opinion the best.

Class 23 we found of average quality; No. 280, "Maid of All Work," is a good pony, and No. 284, "Hill Town Lass," the picture of a boy's hunter, was well ridden in the ring.

Class 24 was a large class, and contained some clever little animals. No. 291, "Paddy," was a strong well-shaped pony, and had good action, and secured the first prize; No. 293, "Tommy," a pretty little boy's pony, with excellent action, was second, and No. 299, "Taffie," a pretty grey, but more suitable for harness than the saddle, was the reserve number. No. 290, Miss Davies's "Lisette," was a clever pony, and full of quality, but showed very hot in the ring.

This class brought our labours to a close, and we consider the classes that came before us were quite up to the average, though, perhaps, not containing many animals of extraordinary merit.

The exhibition of horses, as a whole, must be certainly considered to have been above the average, but still from one cause or another it is very seldom that the competition among horses brings out as perfect specimens of the animal as does that among cattle, sheep, or pigs. No one can say that prize-winners among thorough-bred stallions are as faultless types of their race as Bates or Booth bulls in the cattle classes, or Merton or Goodwood Southdowns in the sheep-classes are of their respective kinds. Horses, however, of great merit are often shown, and the system of open judging is educating the public eye to discern those particular defects or merits in an animal which lose or win for him the honour of a prize.

The Judges report the class of "mares in foal, or with foal at foot, suitable for breeding hunters," as good; but without questioning their verdict upon this point, the class can hardly be said

to have contained many mares suitable for breeding hunters up to more than a light weight. Those of them that appeared well-bred seemed deficient in size, frame, and bone, and it is a serious question whether the number of mares in the country suitable for breeding hunters up to anything like 14 stones is not steadily diminishing. The offer of a handsome prize for mares calculated to breed heavy-weight hunters might be advantageous.

A letter in the 'Times,' of June 1st of this year, to Lord Zetland from the Speaker, than whom no one is better qualified to give an opinion on the subject, invites the attention of the public to the present condition of horse-breeding through the country, so far as it refers to half-bred stock for the road and the hunting-field. After imputing the depression of the business of breeding to the invention of railways, which have caused thousands of farmers to lay aside their riding-horses, the Speaker adds—"Can anything be done to revive and stimulate this declining interest? The means, to be successful, must be simple. We must operate through the farmers. The effort should be a combined effort of proprietors and occupiers. If gentlemen interested in the subject would meet together, and would form an association, and would agree, each of them, to place two or three good mares in the hands of tenants on their estates, in a few years a great change would be effected, and the foundation would be laid of a supply of useful and valuable horses."

Without expressing an opinion as to the suggestion of an association, which, however, if it could once be set on foot, would certainly give a start and an impetus in the right direction, there can be little doubt that it is the want of mares of a good stamp that is operating adversely to the breed of a certain class of horses in the country. Much care is taken, and expense gone to, by farmers and others in seeking out a good sire, while no corresponding attention is paid to the quality of the mares sent to him.

Besides the introduction of railways operating adversely upon the horse-breeding business, it is certain that a formidable cause of deterioration in the trade exists in the very extensive exportation of mares, which is going on throughout the country. From the concurrent testimony of many of the largest wholesale dealers in London and elsewhere, it is shown that the principal breeding districts of the country are ransacked by foreign commissioners, who are on the look-out especially for all the young useful mares they can find. This not only reduces the actual number of mares to breed from but encourages farmers to aim at no higher standard than the production of young horses that will satisfy the foreign demand.

The bull classes of the shorthorns were excellent, and received due credit at the hands of the Judges, from whose Report (signed by two of them) the following are extracts :—

We have before us the large number of 101 bulls, divided into 32 aged, 16 two-year-olds, 28 yearlings, and 25 calves. Taken as a whole, they are the most level lot ever presented before us, and in placing No. 398 first in the aged class, it will be seen that we did not hesitate to notice an animal shown in fair working order. The second and third in this class were animals of great merit.

The two-year-old class, though the smallest in point of numbers, comprised some really good animals. The first-prize bull was of good size and form, whilst his quality and flesh were undeniable. The yearling and calf classes were both large and good, and assisted very materially in making this department of the show highly creditable to the exhibitors.

The Report signed by the third Judge contains the following remarks :—

Class 40.—The largest show of aged bulls I ever saw at any show, many of extraordinary merit. In going through this class, we found at least a dozen remarkably fine bulls, good enough for any herd of shorthorns, and I had some difficulty in agreeing with my colleagues in placing the three prize bulls.

Class 41.—We had not so much trouble, as though the class was generally pretty good, there were three or four very superior animals.

Class 42. Yearling Bulls.—We found several good young bulls. The class was highly respectable generally. There were in this class four or five very promising bulls indeed, particularly those to which the prizes were awarded.

Class 43. Bull Calf, above six, and not exceeding twelve months old.—Some very nice calves were shown, but as this is an age when it is difficult to know how the young ones will grow, it is hard to decide.

Altogether I considered the bulls the best I had ever seen at any show.

As a whole, it may be doubted if the show of shorthorn bulls was ever equalled. There have been, on the other hand, in bygone years, occasions, especially in the older classes of bulls, when the prize animals have stood out more conspicuously among their fellows than do the winners this year; and it is questionable whether the "Earl of Derby," "Edgar," or "Heir of Englishman," will leave their mark in the memory of spectators and connoisseurs in the way in which some of the old heroes of the showyard have formerly done.

In the case of the "Earl of Derby" there was certainly an absence of that comely condition so captivating to the eye of the beholder, and it reflects credit upon the firmness and nerve of the Judges that they upheld their opinion as to his intrinsic merits, though they must have foreseen that they were unlikely to carry the popular verdict with them.

Most of the important herds of the country were represented, and the Wexford half-brothers, winning first and second prizes respectively in the younger bull class, were excellent specimens of Irish shorthorn breeding; indeed there seemed to be but one

opinion, that had there been a prize for the best male shorthorn, "Bolivar" must have taken it.

The last appearance of Colonel Towneley's "Royal Butterfly," now 12 years old, should be recorded. He did not, and could not, have been expected to win any honours with all his pride of youth and even his maturity gone; but his frame is still grand, and well worthy of careful study.

The Judges' Report of Female Shorthorns is as follows:—

We do not consider the *Cow Class* equal to that at Leicester. No. 501, "Lady Fragrant," again takes the first prize; No. 492, Lady Pigot's "Queen of Rosalea," a wealthy good cow, takes second honours. These prizes were soon apportioned, but the third was a matter of greater difficulty, and eventually rested between 496 and 497, the former, Captain R. Tennant's "Miss Farewell," and the latter, Messrs. W. Hosken and Son's "Rosebud," a large, very fat, and tolerably even cow, but she was defeated in the opinion of the judges by the very superior quality of "Miss Farewell." No. 491, Mr. Eastwood's cow, was commended, but she was patchy about her rumps, whilst Colonel Towneley's, No. 498, was very good about her rumps and hips, but light about her fore quarters, and deficient in hair.

The three prize *Heifers in Class* 45, *in calf or in milk*, were very good. No. 508, Mr. Booth's "Patricia," a very grand heifer, full of hair, and fine quality, gained first prize; No. 506, Mr. Lynn's "Queen of Diamonds," obtained second. She was a very evenly grown lengthy heifer and six months younger than No. 503, Mr. How's "Lady Anne," which gained third. "Lady Anne" was also a very good heifer, her fore flank particularly a good point, although very fat, she carried her flesh very evenly, but for breeding purposes the Judges preferred No. 506. No. 502, the Rev. Leonard Charles Wood's "Miranda 10th," was the reserved number; a fine animal, but uneven between the rumps and hips.

Class 46, *Yearling Heifers*, was the best class of the female shorthorns. No. 534, Colonel Towneley's heifer, the most promising animal in all the class for propagating a fine race of shorthorns; with two exceptions she was the youngest in the class, she was a great length, with fine hair and quality, loins particularly good, rump and hips also, and well filled between deep ribs; thighs, fore-flank, and chine good. She, of course, came first on the prize list. No. 536, Mr. Torr's "Cherry Queen 4th," obtained second, being a very nice heifer, but slightly deficient in her fore-flank. No. 521, Mr. Eastwood's "Double Butterfly 2nd," a wealthy fine animal, a little disfigured by being high between her hips, yet good in all other points, and showing great constitution. No. 514, Mr. Stratton's "Ariel," received the reserved number; a very thick but small heifer, and not quite right about her rumps. There were several more promising heifers amongst them. Mr. Pawlett's "Charmer 11th," rather over-rumped, which will probably increase with age. Lord Tredegar's "Star of Gwent" was an animal of some promise. Colonel Towneley also exhibited two heifers in addition to the prize animal, with very fine fore-quarters and good quality, but deficient in their rumps. The Rev. R. Edwards Taylor's "Margary," No. 512, although rather upright in her shoulders, promises to be a breeder of good shorthorns.

Class 47, *Heifer Calves*, possessed several promising animals; here the first prize was awarded to the youngest but one in the class, No. 541, Mr. Stratton's "Flower Girl," a very stylish calf with fine colour, and not overfed. She had good rumps and hips, level back and loins, fore-flank and dew-lap good, neck lengthy and well set into her shoulders, her hair might have been more mossy with advantage. No. 547, Mr. Eastwood's "Red Butterfly," obtained second;

she was a calf of fine quality, with magnificent hind-quarters, hips, rumps, and thighs, all particularly good; but, although very fat, she was slightly deficient behind her shoulders, or she would have stood first. No. 539, Lord Sudeley's "Ceres 4th," was commended, and from the top of her shoulders to her tail head she was a perfect model of what a fat calf ought to be, and had she been judged in that capacity, she must have stood first; her hair and quality were also fine, but she was very small of her age, and her neck bad and short, with an inferior head; and for the purpose of breeding a fine class of shorthorns she could scarcely enter into competition with several others in the class.

In a separate note by one of the Judges, he remarks of Class 46 that there was scarcely an inferior animal among the whole, and after speaking in emphatic terms in praise of Colonel Towneley's prize heifer, he concludes by saying—

I may summarise a report of the female classes, by adding that (setting aside the winners) though there were no animals of extraordinary merit, there was scarcely an inferior one. It was also satisfactory to notice that there was not a single instance of over-feeding, and that most of the cows were in a healthy milking state, which quality, I think, should be taken into great consideration.

Though the Judges' verdict is that the cow classes were not so good as at Leicester yet there were large numbers of cows and heifers present of first-rate quality, well worthy to support the credit of this favourite and rapidly increasing breed of cattle. For every herd that existed five-and-twenty years ago there must be half a dozen or more now, and the value of certain fashionable tribes is marvellously maintained, as shown by the eager competition for any of their blood on the occasion of public or private sales.

The Yorkshire Dairy Cows are thus commented on by the Judges:—

Class 70.—In this class we had great difficulty in arriving at a decision, but were chiefly guided in our award by the apparent milking qualities of the animals. Some of the cows were very large and good.

Classes 71 and 72 require no particular notice.

It is surely most desirable to give every encouragement to these fine milk-producers—a plentiful supply of milk for the infant Britisher being even more important than the supply of beef to the adult. Medical and other evidence points indisputably to the facility afforded to the agricultural labourer in the North of England and in Scotland generally, in respect of a supply of milk for their families, as one main cause of their superiority in stature and physical development over the working classes in towns and manufacturing districts, as well as over the agricultural labourers in those parts of England where no adequate supply of milk is easily obtainable by them.

It would be better if the milking qualities of our three most prominent races of cattle were not, as is too often the case,

overlooked, in the anxious desire to secure every additional pound of beef.

The Report of the Judges of Hereford cattle makes short work of them, as they confine themselves to saying—

> The Judges regret that so few entries have been made of the Hereford cattle, and they are unable to speak in very high terms of all the animals brought under their notice. They consider, however, that the cows and 2-year-old heifers are excellent representatives of the breed.

Considering that Manchester is not so far removed from the strongholds of many of the Hereford breeders, a larger show of these fine animals might have been looked for; but it was generally admitted that the deficiency in numbers was compensated by the fine character and general excellence of those present. It must be gratifying to those who take a special interest in the success of this breed of cattle to see that the vacancies caused by the recent death of many well-known patrons and breeders have been filled up with the names of new competitors for the honours of the "Prize Ring."

In the "Aged Bull Class" Mr. Arkwright won the first prize with his fine animal "Sir Hungerford," winner of the first prize in his class last year at Leicester, and this year at Southampton.

In Class 49 Mr. Morris, a new exhibitor, was awarded the first prize, beating the Queen, and three others. The Yearling Bull Class, with only three entries, and the Bull Calf Class with only five entries, do not call for any special remark, unless it be in favour of Mr. Tudge's bull calf "Ostorius," one of four first prizes taken by that gentleman in the Hereford classes. The cows were few—only five—in number, but they were very good.

In Class 52 Mr. Allen's "Queen of the Lilies" was placed first; Mr. Tudge's "Lady Adforton" second. They were both fine specimens of Hereford cows.

In Class 53 Mr. Tudge was first with a beautiful heifer, "Diadem," third in her class last year at Leicester; Mr. Arkwright's heifer, 579, now taking only the reserved number, with a high commendation, but having then been first.

In the "yearling heifer" and "heifer calf" classes, there were some extremely promising young animals, and in the case of these two classes, as indeed of most of the others, there has perhaps never been a show where there were fewer bad animals; although, of course, it would be—as the Judges remark—impossible to speak in high terms of all.

The report current in the Show Yard, that some considerable purchases of Herefords had been just made for Australia, as well as for Ireland, must be encouraging to the admirers of this

breed, and must tend to put the shorthorn men upon their mettle.

The show of Devon cattle, like that of the Herefords, was scarcely as large as might have been expected, even taking into consideration the distance between Manchester and the places where they most do congregate. The Judges say :—

The show of Devon cattle at Manchester was not so large as at many former meetings, nor were there so many animals of superior merit as have been frequently exhibited.

There were only four bulls in the old class, and it may be described as a fair one, but scarcely above mediocrity.

In the class for the 2-year-old Bulls, five animals only were exhibited, and it was decidedly a bad class.

In the Yearling Bull class there were only five entries, and not one superior animal.

The Bull Calves numbered six. There were several very nice animals, and it may be considered a good class.

The Old Cow class contained six nice animals, and the first and second prize cows were good.

The Heifers numbered six, but the class on the whole was inferior.

The Yearling Heifers were much better, and contained some very nice animals indeed.

There were only five Heifer Calves, but they were all good ones.

There were in all 44 entries.

In the Bull classes Mr. W. Farthing won three first prizes, and his aged bull, though not specially noticed in the Judges' Report, appeared a very fleshy and wondrously short-legged animal. "Master Arthur," first at Southampton, was first again at Manchester in the class of younger bulls.

Mr. Burton's yearling heifer, "Daisy," was perhaps of all the females the most attractive to the eye.

The Channel Island cattle are thus reported upon :—

A very small show of Channel Island cattle; nothing very good in the Bull class. There were a few good animals in the Cow and Heifer classes, but the Judges suggest that the Guernseys ought not to be exhibited with the Alderneys, as it impossible to give satisfaction where the size is so totally different.

Of the classes embracing Scotch, Welsh, and Kerry, the Judges conjointly report very favourably, although it is much to be regretted that the entries were not more numerous.

In the case of the Scotch cattle, especially the polled Angus and Galloways, this deficiency in numbers may probably have been caused by the great attractions of the Highland and Agricultural Societies' Show at Edinburgh, where it appears that Mr. M'Combie was, as usual, very successful with his Aberdeens, and where the show of Ayrshires was one of the largest ever seen.

Class 76. Polled Angus Bulls.—The first prize a high-class animal.
„ 77. Pair of Polled Angus Cows.—Very good.
„ 79. Polled Galloway Bulls.—All first-class animals.
„ 73, 74, 75. Ayrshires.—First and second prizes good of their class.
„ 85. Welsh Bull.—First prize, a good animal.
„ 88. Kerry Cow.—First prize, a pretty animal.
„ 81. Galloway Heifers.—Not first-class.
„ 86. Welsh Cows.—Doubted about giving a first prize.

In a separate note one of the Judges of these classes expresses his opinion that the show of stock was a fine one, and he concludes some other remarks by saying—

Allow no animal to compete in any class unless it appears in its natural state; therefore, disqualify all animals that have had hair abstracted, their horns polished, or their milk artificially improved.

There is no denying the desirableness of what is here pointed out, and the Society has shown its anxiety to give due weight to the merits of animals shown in a natural condition;* but it would seem to be almost impossible to lay down such a standard for this "natural condition" as would ensure a uniform decision in reference to it by all Judges of Stock.

A very short report from each of the three Judges of Leicester sheep has been received. Two of them do not consider the class of shearling rams on the whole as good a class as they have seen before—one of the writers remarking that some of the sheep did not appear pure-bred. He considers, however, the aged rams as a class to have been good, and to have shown more purity of blood; while of Class 91 he says:—

Two of the lots of shearling ewes were very good, and appeared pure-bred; the other lots were not so good, nor in my judgment so well-bred. He adds: If I may be allowed a few remarks, I think it is very desirable that the pure breed of Leicesters should be more encouraged by giving more and better prizes. There ought to be a class for 2-year-olds, as they have not a fair chance of competing with 3-year-olds. I likewise think the Exhibitors should certify that the sheep shown by them as Leicesters are to the best of their belief pure-bred, and that judges should be told not to award prizes to any sheep but such as seemed to them to be pure-bred.

The other Report specifies Mr. Sanday's first-prize shearling, as a beautiful sheep, with good head and neck, splendid wool, a little deficient behind his shoulders, and hardly standing wide enough on his forelegs. Mr. Borton's second-prize sheep, as being small, head and neck not good, but with first-class wool and mutton. Colonel Inge's third-prize as a useful sheep, and likely to get good stock. Of the aged rams it says they are, as a class, very good.

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* See Conditions for Cattle, Nos. 3 and 4, on the Prize-sheet.

"Mr. Borton's first-prize, Four-shear Sheep, retaining his form beautifully, considering his age." It ends thus: "The shearling ewes, I think, I never saw better; the first and second are splendid animals. In the third-prize pen there is one which quite spoils the lot. Take the whole as a class, they are bad to equal."

The third Report specifies no particular sheep, but says of the respective classes:—

Class 89.—I think there has seldom been a better lot shown for so large a class.

Class 90.—Very superior throughout for so large a quantity of aged rams. The class to be commended all through.

Class 91.—This was a very good class, and we had great difficulty in deciding some of the honours.

All lovers of sheep stock, whatever their special fancy may be, must watch with great interest the well-doing of the pure Leicester breed of sheep, from which at least two other breeds of sheep, now classed as distinct, have sprung, and to which, moreover, though it is often stoutly denied, these later breeds have occasionally to repair for a fresh infusion of the blue blood of the older and more aristocratic race; and it is gratifying to learn that the Judges considered those shown at Manchester were, generally speaking, excellent examples of their species.

Of Cotswolds and Oxfordshire Downs, the entries were respectively 25 and 36 in number. Of them one Judge reports:—

I beg to say a few of the "Cotswolds" were tolerably good, but, on the whole, the class was not so well represented as heretofore, and besides not being so good, there was a much smaller entry.

Another writes:—

I beg to say that I consider the show of "Cotswold" shearlings not up to the standard of former years. There was not a sheep that well represented the class they were shown in.

In Class 93 there was but a small competition, yet I consider them a fair average of the "Cotswolds," and had there been more in number, I should have thought the class a very good one.

In Class 94 there was but one entry, and that not calling for any special remark.

Of the "Oxfordshire Downs" the first of these writers says:—

The Oxfordshire Downs were quite the reverse. I considered that it was a very good class of sheep, both as to numbers and quality. I think the opinion of the 'Mark Lane Express' is good respecting the difference of ideas that exist as to what an Oxfordshire Down should be. I consider we want as much flesh as possible, and the reason of those sheep that have been taking prizes at the local shows being nowhere is, I think, that they have been travelling so much; they have lost the hand, which was not the case with Mr. Wallis's first-prize sheep, who was a noble fellow, and I fear we shall be a long time before we see the whole class to correspond with him.

The other Judge writes:—

Class 98.—This class was well represented, and I thought it as good a class of shearlings as are often seen together, especially No. 881, bred by Mr. Wallis, of Old Shifford. This large class deserves commendation.

Class 99.—A good entry. I think this class of older rams very good, and worthy of very high commendation.

Class 100. Shearling Ewes.—A very good class. I should have much liked to have given another prize in this class, as they were well deserving one. Taking all the classes in the Oxford Downs, they were very good.

Compared with many previous exhibitions, the number and, indeed, quality of the Cotswolds show a great falling off. This is much to be regretted, and is difficult of explanation, as it is said that they are by no means going out of favour, the report on the Cotswold hills last winter being that the demand had been very good for them of late.

In Lincoln and other long-woolled sheep not qualified to compete as Leicesters or Cotswolds there were 44 entries.

The Judges say:—

Class 95. Shearling Rams.—There were 21 entries in this class. The first and third prizes were awarded to Messrs. Dudding, and the second to the Hon. Robert Henley Eden. The first and second prize sheep were very good, combining great size with heavy wool.

Class 96. Rams of any other age.—There were 14 entries in this class. The first and third prizes were awarded to Mr. W. Marshall, and the second prize to Messrs. Dudding. The above named sheep, with the one highly commended, were good specimens of the Lincoln sheep: great size, and heavy wool.

Class 97. Shearling Ewes.—There were four entries in this class. The first and third prizes were awarded to Mr. T. Cartwright, and the second prize to Mr. John Pears. This was a very good class of sheep, with the exception of one pen, which was not worthy of commendation.

Owing to the Judges of the Southdown classes differing in opinion as to what is called by one of them "the most important features relating to Southdown sheep," two Reports have arrived, one signed by two and the other by one of the Judges. The joint Report says:—

The exhibition of pure Southdowns was smaller than usual, there being only 46 entries; but the specimens from the flocks of the Duke of Richmond, Lord Walsingham, Lord Sondes, Sir W. Throckmorton, Mr. Rigden, &c., &c., were especially good.

The three prizes in the class of Shearling Rams were taken by the Merton flock. The first prize, No. 915, was an admirable sheep; girth large, level good back, the tail set on a little too low, the legs good, and the quality of flesh and wool excellent. Lord Walsingham had eight sheep in this class of very good character and quality. The Duke of Richmond showed sheep in this class of fine quality and purity of blood. We thought highly of them, as also of Mr. Rigden's 909 and 910. Messrs. Heasman also exhibited some very useful sheep.

In the class of Rams of any other age, Sir W. Throckmorton took first and second prizes with two very superior animals, showing great purity and perfect Down type. Lord Walsingham and Mr. Rigden also had good sheep in

this class, and the Duke of Richmond's No. 937 was an animal of great merit, possessing the first quality of mutton and wool, with beautiful character, but was not level on the back. Lord Sondes and Mr. Humphrey showed some good rams also.

There were 11 entries in Class 103 for pens of Shearling Ewes. Some were exceedingly good. We considered Lord Sondes's surpassed all the others, and awarded them the first prize. Sir W. Throckmorton took the second prize with a pen little inferior to the first. Lord Walsingham exhibited two pens of very good and useful ewes, showing substance and good breeding. We thought this class generally good.

The Report ends by an expression of regret on the part of the writers that they cannot ask their fellow Judge to append his name, as they differed so materially from him as to the quality of the Southdown sheep shown, and as he had protested against their award.

It is, of course, a matter of interest to all lovers of stock-breeding, and especially to the breeders and admirers of pure Southdowns, to ascertain the reasons which induced Mr. Ellman to differ so widely from his fellow Judges in his opinion of the merits of the sheep of that race exhibited at Manchester. In his separate report Mr. Ellman says:—

The object of the Royal Agricultural Society is the encouragement of the breeding and improvement of animals. The distribution of the classes clearly shows the intention of the Society to be the encouragement of purity of breed, without which we should have a heterogeneous mass of animals, involving the Judges in a labyrinth of difficulty to distinguish breeds. A responsibility is attached to the duties of a Judge, which I endeavoured to meet with assiduity and honest intention.

We commenced operations by scanning the merits and demerits of the yearling rams of the Southdown breed, and I regret to announce the conflicting opinions thus early engendered, which were not diminished as we proceeded. With regard to appearance, who can decide but a breeder of the animal in its native district?

Every animal has been bred for some particular purpose, and in many districts for different purposes; as, for instance, the Leicester sheep for feeding on flat and rich soils, while the Southdown sheep have been shaped for working upon poor and mountainous districts. The wool of the first makes a profitable investment, the latter a protection against the inclemency of the weather in exposed districts.

I am particular upon this subject, as thereon hangs the thread of our conflicting opinions. I freely admit the merits of the Southdown sheep in general; and, if no criterion of purity is to be observed, very little difficulty will exist. In that case it would be only necessary to select the best-formed animal. Upon first examination of the Southdown yearling rams I was puzzled to decide upon the predominant feature; so different were the shades, from black to white.

In this dilemma I could only refer to the prevalent colour of the face, the quality of the wool, and general appearance of the animal, which constitute a good Southdown sheep, and are generally adopted by native breeders.

With respect to the exhibition of Southdown sheep at this meeting, it did not meet my expectation, either in the quality of mutton or their general appearance. A prevalent opinion appears to exist in inland counties that quality and form should be sacrificed for quantity. This is a heterodox

which I cannot subscribe to. It is diametrically opposed to the teaching of the Bakewell school.

I will conclude my remarks upon the young Southdown Rams by stating that the first prize was truly deserved. The second and third prizes were given to sheep of moderate pretensions, and we had some difficulty in the way of commendation.

Our attention was next directed to Class 102 (old Rams), where the character was tolerably uniform. The splendid ram 137 was found upon inspection to be deficient in wool. The first-prize Ram, indeed, had ill-formed hocks and knees, which for working purposes on hilly districts are very objectionable. The third-prize Ram had his faults as well as merits, and he was very narrow.

Now came the tug of war in Class 103 for Shearling Ewes. The first and second prizes were given in this class, according to my opinion, improperly. The five in each pen represented different flocks in appearance, although no doubt bred from the same flock. The backs and quality of these ewes were good, but with such detestable necks and faces that I doubt if any breeder on the Southdown Hills would retain them for breeding purposes were they to stray into their flocks.

The third-prize ewes were useful, and with care might be easily improved. They have plenty of size to spare, depth of flesh, and might easily be reduced to first-rate quality. Nos. 948 and 950 were meritorious.

After then giving his opinion as to the Hampshire sheep, which will be alluded to subsequently, Mr. Ellman concludes by saying—

If in most of the decisions in the short-wool classes the characteristics of Southdown sheep were ignored, still upon the whole the show was a success, and the increased quantity of food compensated for the loss of quality.

Mr. Ellman doubts the necessity of having inspection, if the Judges are acquainted with their business. He noticed some sheep which, from having tumours, he thinks should not have been passed. He thinks too much care cannot be bestowed upon the selection of Judges, who should be well acquainted with the stock for which they are appointed, and he asks, "Should they not be eminent breeders of pure-bred animals?"

Probably Mr. Ellman's colleagues would stoutly maintain—and, if they answered his remarks and arguments at a corresponding length to his own, would undertake to prove—that they too had, in their decisions, shown a due regard for the maintenance of the typical character of the pure Southdown breed. Still an impression seems certainly to have prevailed among many in the Show Yard that, with respect to not a few of the sheep exhibited, there was room for criticism as regarded their deficiency in uniformity of character, and one cannot but consider that he who watches over the sources of any of our great national breeds of stock, with, it may be, even an excess of jealousy, is fulfilling a useful part in his generation.

Of Hampshire Downs there were only 18 entries, and they are thus reported on by two of the Judges:—

Only three exhibitors. The sheep shown were very creditable. Mr. A. Morrison obtained first and second in Shearling Rams, Mr. Russell first prize for aged Rams, and Mr. Rawlence first and second prize for Shearling Ewes, as well as second prize for his aged Ram.

Mr. Ellman says :—

The Hampshire classes were very useful, but I have seen better shown. The two pens of ewes did much credit to their breeders; they finished a close race for first prize. The Old Rams of this large breed were not equal to others on former occasions. The first-prize ram was fitted only for commercial purposes ; the hide and fat are valuable articles in certain markets, the quality of mutton is nil. The other rams in the same class were not well-formed, but of good quality both of mutton and wool. The younger rams showed an improvement ; but I cannot be responsible for the correctness of the awards.

The classes of Shropshire sheep are, as they deserve to be, very highly spoken of by the Judges, who say :—

Class 104. Shearling Rams.—The entries of rams in this class comprise the unprecedented number of 74, a large proportion of which possess very considerable merit. The first-prize Ram, No. 979, belongs to Lord Chesham, and is a very excellent animal, having a good well-covered back, wide loin, good and well placed dock, large legs of mutton, with a fleece of wool of fair weight and quality. The colour of the face is of a lighter shade than we like, but there is not sufficient to complain of to warrant us in passing over this ram, which we consider the best animal in both ram classes.

The second and third prize Rams, viz. No. 999, the property of Mr. Coxon, and 990, belonging to Mr. Beach, are also good animals, and excellent specimens of Shropshire Down sheep.

Class 105. Rams of any other age.—The three prize animals possess considerable merit, and reflect credit on their owners. We consider this class well represented, and superior in many respects to what we have seen at former exhibitions.

Class 106. Shearling Ewes.—In this class there are 11 entries, and it will be readily seen what our opinion of them is, when, with one exception, we specially noticed every pen. The first prize was awarded to No. 1066, the property of Mr. Nock; the second to 1065, belonging to Lord Chesham ; the third to 1070, the property of Mr. H. Wood. As a whole, the class is the best we have seen.

If there were differences of opinion as to whether the type of the pure Southdown was being preserved in some of our flocks, as evidenced at Manchester, there could be but one opinion as to the want of a standard by which to judge of the typical merits of a Shropshire sheep. Nothing can be more puzzling to the uninitiated than to attempt to arrive at any conclusion as to what are the fixed landmarks which should guide him in his selection of a model sheep of this breed ; and, beautiful as were some of the animals in these classes, they clearly lacked uniformity of character, and it seems very desirable that the Shropshire breeders should settle among themselves, once and for all, the colour and shape, as well as the quality of wool, of this noble class of sheep, well described as one of the best rent-paying breed of sheep in England.

Of the Lonks there were 15 entries, of the Herdwicks 19, of the Limestones 5, and of the Black-faced Scotch 13.

The Reports of the Judges on these classes are favourable; one contains the following remarks:—

LONKS.

Classes 110 and 111.—I consider these classes well represented.

Class 112.—In this class shearlings were shown in competition with ewes, which occasions some difficulty in arriving at a satisfactory decision, and I recommend that in future they be classed separately. This was also a good class.

HERDWICKS.

Class 113.—The six rams were a fair average of their kind.

Class 114.—A good class: the three prize animals doing great credit to the exhibitors and breeders, particularly No. 1118, which I think one of the best Herdwicks I ever saw.

BLACK-FACED SCOTCH.

Class 125.—There was an excellent show in this class. The winner of the first prize was a splendid sheep, and, indeed, the whole of the rams shown were particularly good.

Speaking of the Lonks, the Report of the other Judge expresses the opinion—

That a more numerous entry might have been expected for a class of sheep which have attained such importance, and which appear so suitable for the high grounds of Lancashire and Yorkshire. They, however, possessed great merit, and I could not but remark the improvement made since I had last an opportunity of judging them, in 1862, at Preston. What struck me was the improvement in the quality of wool and squareness of frame, embracing hardihood and constitution.

Of the "Herdwicks" it is remarked—

This peculiarly hardy race of sheep, so well adapted to the high bare hills of Westmoreland and Cumberland, possessing constitution to weather the severest storms, must be considered to be well represented here, the rams showing that wildness and activity so essential in a mountainous district.

It disappointed this writer to see so small an entry for "Limestones;"—

A class of sheep (he adds) said to thrive on ground where no other kind can live—a matter of great importance. Otherwise this class struck me as possessing little merit, seeming hard to feed, and carrying little wool.

This Report also speaks very favourably of the way in which the "Black-faced Scotch" were represented, and especially alludes to the merits of the first-prize shearling ram.

Though the "Cheviots and Border Leicesters" come last in the Catalogue, they are sheep of much importance. The Border Leicesters, not long ago to be found only in Northumberland and the Borders, are much appreciated now in other parts of both England and Scotland, and it is said that there is a con

siderable exportation of them to Ireland going on at this moment. They are described by one who knows them well as of large bone, with great aptitude to fatten, and an excellent tenant-farmer's sheep. There were, however, only 31 entries of them, and only 6 of Cheviots. The same cause, as has been already alluded to as thinning the entries in the class of Scotch cattle, namely, the Highland and Agricultural Show at Edinburgh following so closely upon the Manchester Meeting, probably operated to diminish the entries in these two classes.

The Judges' Report is scanty, and simply says, "we found the animals good, but fewer in number than we expected," which they account for in the manner that has been already alluded to. They think the "Committee should be a little more particular in their inspection as to clipping."

None of the prize animals among either the Border Leicesters or Cheviots are singled out in the Report for commendation or otherwise, but certainly Mr. Laing's first-prize Shearling Ram, 1149, and Messrs. Dinning's first prize, 1155, appeared excellent specimens of Border Leicester sheep.

The Inspectors of shearing, after calling the attention of the Stewards to some cases where, in their opinion, the rules of the Society have not been strictly complied with, remark that they are happy to say that no "flagrant" case came under their notice. This is satisfactory, and there is little doubt that a great improvement is to be noticed in the shearing of sheep, especially in those classes which are represented in the Royal Prize List every year.

The good effects produced by inspection are shown by the marked contrast, in respect of shearing, between the Manchester Show of 1869 and that at Worcester in 1863.

Probably the shearing of some of the North country sheep was open to remark, and it may be as well to provide another year either for one of the inspectors to be specially conversant with these northern breeds of sheep, or else for a wholly separate inspection of them.

This may be an appropriate place for saying that some improvements may perhaps be made in the arrangements connected with the sheep and pig judging. Under the present system the Judges are inconveniently pressed upon, and some better plan of roping off a proper sized space, together with the help, during the day, of an assistant Steward, seems desirable.

Pigs.—Surely the Judges of this excellent show of pigs must have found it difficult to follow their instructions, "not to take into consideration the present value to the butcher of animals exhibited, but to decide according to their relative merits for

the purpose of breeding." It would be impossible to see at any show of fat stock animals in a greater state of obesity than were the majority of the pigs exhibited at Manchester. There were some exceptions, however, such as Sir George Wombwell's second-prize pigs in Class 140.

The Judges report favourably of the classes generally, and say that the character of the different breeds was well sustained, and they point out as worthy of special notice Class 135 (sows of a small white breed). They add, "We were somewhat perplexed in having to give a prize to an animal with a partial black skin exhibited as a white pig."

It is satisfactory to record that, though there were some disqualifications on account of defective dentition, these were fewer than usual. The introduction of a Young Boar Class seems to have been appreciated, and some good young animals were shown.

There were 132 entries in all, and while Mr. Peter Eden represented most successfully the local fame of Manchester, Mr. Duckering, Messrs. Howard, and other well known names, amply maintained their porcine reputation.

At the Annual Meeting on Wednesday, presided over by the Prince of Wales, a vote of thanks to the Mayor and Corporation of Manchester, for their cordial reception of the Society, was passed unanimously, as was also one to the Local Committee, when the names of Mr. Davies and Mr. Whitworth were, as they deserved to be, brought prominently forward, as having each of them largely contributed, by their unremitting exertions, to the excellent arrangements made for the Exhibition.

Subsequently M. Edouard Lecouteux, Secrétaire général de la Société des Agriculteurs de France, accompanied by M. Hervé Mangon, M. le Comte Diesbach, M. Barral, M. Ronna, and other eminent French agriculturists, were presented to his Royal Highness. They expressed their regret that M. Drouyn de Lhuys had not been able to be present, and they thanked the Prince for the honour he had done to French agriculture in consenting to become an Honorary Member of the newly formed "Société des Agriculteurs de France."

After the Prince of Wales had vacated the chair, Mr. Duckham brought under notice some resolutions which he announced as having been passed at a meeting of breeders and exhibitors of cattle and sheep that morning. Some points of interest were contained in the resolutions, and the Duke of Richmond, as Chairman, undertook that they should be laid before the Council, and receive every consideration.

The warmest thanks of the Society are due to the Rev. Dudley Hart, Rector of the parish of Stretford, for the very ready way in which he responded to the request that he would hold Divine Service in the Show Yard on the two Sundays which occurred during the period of the Stock being at Manchester. The Services, earnestly and impressively performed, were very fully attended, and evidently much appreciated; and with reference to the question of the arrangement which prevents the Stock getting away before the second Sunday, it is very doubtful whether the interposition of a perfect day of rest, between the confusion and wear and tear of the previous week, and a long and fatiguing journey, is not the best, and a much needed, preparation for both man and beast.

Whether, then, for the brilliant success of the Show itself, or for the incidental but all important circumstance connected with it, of the presence of the Prince and Princess of Wales, the visit to Manchester will be an ever memorable epoch in the annals of the Society, and neither the spectacle of the endless rows of shedding, with all their varied contents, nor that of the ceaseless stream of human beings, eager in their determination to see everything, can be readily forgotten.

The Stewards, and other officers of the Society, must always retain a lively recollection of the kindness and attention, not only of those with whom they were brought into official connexion, but also of many others, who welcomed them to their houses in the frank and genial manner which has long made Manchester hospitality famous.

The writing of this Report, as Senior Steward, gives me, on leaving office, the opportunity of expressing my warm thanks to my fellow Stewards for the ready and efficient assistance they have always given me in the execution of our common duties, any failure in the due discharge of which, I am fully sensible, should be laid upon me alone.

Holme Wood, Peterborough.

XVIII.—*Report on the Exhibition and Trial of Implements at Manchester.* By Sir EDWARD KERRISON, Bart., Senior Steward.

THE Show-yard at Manchester contained a larger collection of Implements than has been exhibited at any previous Meeting of the Royal Agricultural Society. Gradually increasing in number year by year, no less than 7724 entries appear in the Catalogue for 1869; exceeding by more than 1300, or nearly

twenty-five per cent., those shown in 1868; and by nearly 3000 those shown at Bury St. Edmund's in 1867, which was almost exclusively an exhibition of implements. Technical education must rapidly follow the increased desire for general education, or agriculturists will be unable fully to appreciate and adopt the extraordinary efforts and inventions of the English manufacturers to cheapen the productions and facilitate the labours of the farm.

As the flail has of late disappeared from the barns of this country, and been replaced by machinery, so, after this successful exhibition, will the scythe and sickle gradually cease to be used in our fields.

One great feature of the Manchester Meeting was the exceedingly severe trial of the reaping and mowing machines. Of the former no less than 84 were selected for trial by the Judges, and of the latter as many as 52 competed. The prizes were not adjudged until Tuesday in the week of the Show, in consequence of the number of implements to be tried and the closeness of the competition. The trial ground produced a fair crop of rye and a good crop of grass, and was most conveniently situated for visitors to the general Show.

A comparison of the report of the trial of implements at Plymouth, in 1865, with that of this year, will show the great progress made by the exhibitors in the mowing and reaping machines; and it required the utmost discrimination in Mr. Sanday and his brother judges fully to test their various merits.

The greatly increasing competition at all the annual trials is a proof of the importance attached by the exhibitors to the possession of a prize. Although many of the same implements are exhibited at local shows, purchases are often not completed until after the test has been applied by the Royal Agricultural Society, and the prizes have been awarded by them.

More work appeared to be thrown on the judges in this department than, with the best management, they could possibly achieve before the opening day of the Show. It is obviously to the advantage of the exhibitors that the trials should be over before the public are admitted. Every implement intended for competition ought, therefore, to be so entered that the ground may be measured and prepared beforehand for trials. The first day has been annually lost in the selection of implements, which might thus be utilized. To this plan the exhibitors have hitherto objected, but the loss to them and to the public who visit the Show, and perhaps leave before the awards are published, should induce the manufacturers to meet the wishes of the Society in every way which may tend to facilitate their arrangements.

No doubt more judges than were selected for the Manchester Show should in future be appointed by the Society, and a smaller class of implements given to each set of Judges in the trial yard.

The one-horse mowing machines were found too heavy in draught for general use, and after this last trial they will probably be scarcely again manufactured in any great number; the most willing horse failing, without frequent rest, to cut any breadth of grass, and the work evidently straining the animal beyond what it could bear for any length of time without injury. A most interested crowd of spectators followed the trials of the reaping and mowing machines, more so than had been seen in any previous trial-field. The horse-rakes and hay-collectors were placed in separate classes, by special arrangement of the Council, and the Stewards were therefore unable to allow the combined implements to be tested in the two classes, for which they might be equally well adapted.

The trials of carts and waggons weighted with several tons of iron, and tested by the dynamometer, produced the closest competition. In the miscellaneous classes, the Judges may well in their Report ask for more classification, where they have to wander through upwards of 7000 articles to select seven for medals. This class has gone beyond even the name it bears. It comprises the solid and useful implements of husbandry; the small and ingenious contrivances which tend to economize labour and time; new inventions requiring the encouragement of public notice, through the means of the Judges, to be brought to perfection; and thousands of appliances for comfort, most interesting to all, especially to the agriculturist or the resident in the country; and it is impossible that one set of Judges should fully examine, or even fully understand, the merits of all these articles.

At any rate the classification of these various products of our mechanical skill should be made more perfect, or much in the four or five miles of shedding, such as was this year to be seen in the Manchester Show-yard, must be passed over without attracting sufficient attention.

In the report of such a meeting, which was, on the whole, undoubtedly a great success, it is the more necessary to suggest such improvement as may in future be made in the arrangement of the Show.

The presidency of his Royal Highness the Prince of Wales contributed largely to the attendance on the two days when he visited the Show-yard. Indeed, the impetus given by his presence at the head of a Society which springs from, and is entirely main-

tained by, the voluntary efforts of agriculturists, is felt through the whole community, interested alike in the increased and economical supply of all kinds of food for the people.

Thanks to the liberal arrangements made by the local committee, thousands of visitors were enabled to see their Royal Highnesses whilst viewing the objects of interest in the Show-yard.

On Wednesday, a deputation from the French Agricultural Society (unfortunately, at the last moment, deprived of the presence of Monsieur Drouyn de Lhuys) were received by his Royal Highness the Prince of Wales, and formed a pleasing illustration of the common interest which binds together the kindred Societies of France and England.

Since writing this notice of the meeting at Manchester, the reports of the Judges of the various classes of implements have reached me. They confirm substantially the preceding remarks, and are appended to this report *in extenso*.

One word more with reference to the staff of officials in the Show-yard before concluding this necessarily brief Report. Some experience in office has satisfied me that the most general desire prevails on the part of those who are actively employed by the Society, not only to consider, but to invite criticism on their management, with a view of either lightening the labour or diminishing the expenses of exhibitors, for in the discharge of onerous duties, it is possible that improvements may escape the notice of those most anxious to observe and report them to the Council.

REPORTS OF THE JUDGES OF IMPLEMENTS AT MANCHESTER.

1. *Report of the Judges on Reaping Machines.*

When we consider the importance of the reaping-machine to the agriculture of the civilized world, it gives us little surprise to report that at the Manchester Meeting no less than ninety-eight reaping and mowing-machines entered the lists as competitors for the blue riband of the English harvest-fields.

The opening day of the yard, Monday, July 12th, was spent by the Judges in inspecting the various reapers at the different stands, in the vast area only to be found at a Royal Agricultural Society's Meeting.

After careful examination they selected for trial 84 machines, of which 25 were combined reaping and mowing-machines; 13 were reapers with a swathe side-delivery; 18 reaped and delivered in sheaf; 9 were manual delivery machines; whilst 19 were one-horse reapers.

It was obvious to the Judges during Monday's inspection that a great advance had been made among the exhibitors during the last few years, and it happened aptly that a machine on Messrs. Hornsby and Sons' stand was appropriately called "The Progress."

Now that most of these machines are so equal and so perfect in their cutting powers, it struck the Judges that the makers had turned their attention to the important point of endurance; this has been effected in the case of Messrs. Hornsby and Sons, Burgess and Key, and Bamlett, by the adoption of an oil-reservoir inside of the brass bushed crank-axle, by which, with the aid of cotton waste, continuous lubrication is brought to bear on the fast motions.'

Regarding novelties and new inventions at this meeting, we would notice a combined reversible reaper and mower, No. 42, exhibited by Mr. W. Harkess, of Lostock Graham, Cheshire. It is made entirely of iron, and cuts either right or left, has a double finger-bar and knife-blade, the platform swings over by pulling a chain, and from an arrangement in the machinery, the horses are turned at the headlands, in the same manner as in the plough, enabling it to cut up and down, or across the corn, as is the case with "Bell's reaper." Had this machine been more perfect in construction, it would have taken a place for a medal, but as the Exhibitor observed to us—"it is yet in an imperfect state."

Perhaps the most ingenious reaper exhibited was "The Star," claiming to be a novelty, and belonging to the inventors, Messrs. Foster and Sons, of Witham, Essex. It has no gearing, the reciprocating motion being gained by a curved ridge or cam inside the driving-wheel, acting upon steel friction rollers, connected to the knife by a lever. This motive-power is not a new one, having been used by the Rev. Patrick Bell, in his original reaper, so far back as 1850. A useful improvement in this machine is an india-rubber ring, inserted below the driver's seat to take away the jar.

Another novelty was exhibited by Mr. William Brenton, of Polbathic, St. Germans, Cornwall. It consisted of a patent cylinder reaping-machine, fitted with a galvanised iron roller platform, about 10 inches in diameter, stuck over with short metal knobs, each 1 inch in length. The roller is placed at the outer edge of the platform, and is kept asleep (by means of a cogged segment) while the sheaf is forming on the tilting-board, and put into action simply by touching a spring with the foot, when the sheaf is ready for delivery; although it did its work admirably on some sides of the corn, the Judges did not consider it was yet in a perfect state.

Messrs. Pickslcy, Sims, and Co., Leigh, near Manchester, showed 12 mowers and reapers, No. 1974 being a new implement, in which a "Sun and Planet" motion is used to get up the speed of the knife; all the machines exhibited by this Company have an ingenious arrangement for varying the speed of the knife, and the change of gearing is instantaneous. These machines are all good looking, and admirably got up.

On Messrs. Hornsbys' stand the Judges selected 7 out of 17 exhibited, and these 7 may be regarded as types of the rest. The excellence of the machines of this firm exists in their having wrought-iron driving-wheels, and open knife-blades instead of solid ones, which are liable to choke with grass. The delivery of the corn is effected by a rake working without cams on an inclined axis, the cog-wheel machinery is fixed in the inside of the work, and the screw-nuts are all secured by counter-sunk split pins.

Mr. Bamlett, of the Vale of Mowbray Works, Yorkshire, showed 22 mowers and reapers, fitted with oil-reservoirs and patent finger-plates. Mr. Bamlett was found to have reduced the stroke of his knife from 3 inches to 2½; the consequence of this upon the durability of the machine must be left to experience.

We found Mr. W. Mattison, of Leemingbar, Bedale, Yorkshire, had increased his stroke to 5½ inches, the cutter-bar clearing two fingers at one throw, a principle which was tried unsuccessfully by Mr. Wylie in Scotland five years ago.

Messrs. Howard, of Bedford, had a large collection of beautifully built double-cam improved American machines; they made good work at first, but did not keep their place during the trials, evidently from a want of proper adjustment of the rakes and fans.

The ground set apart for the trial of reaping-machines consisted of two large enclosures cropped with rye, which was about half ripe; they were adjoining the showyard and very convenient; they had been drained, levelled, and specially prepared for the Society, so that a fair and equitable field was given to all competitors. The crop was a good one for the season, and a little swung over in both fields, but none of it was laid; this latter state was, however, effected by the Judges causing a part of it to be well rolled down for the final trials,—a process which seemed to afford considerable amusement to the bystanders, as well as to the Exhibitors themselves.

The Judges resolved that the order of proceeding on Tuesday morning should be a short preliminary trial with each machine, which was then commenced, and from the great number of machines to try, and occasional delays in procuring men and horses, these preliminary trials were not concluded until midday on Thursday. Careful notes were taken of the quality of the work done, the temperature of the bearings, and the apparent strain upon the horses. During this time a staff of surveyors, under the guidance of Mr. Smith, cut out the remainder of the fields into $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ acre oblong plots, this was done by the assistance of the Beverley Company's pushing machine, the Company, at the request of the stewards, having furnished their "Pusher" for the purpose of cutting out the roads.

These trials were as searching and prolonged as time would admit, and whilst we gave every consideration to the merits of each machine presented to our notice, we were most especially attentive to score every point that could be made for the smaller makers; yet some of their machines, although excelling in workmanship and lowness of price, when brought under the dynamometer test, failed entirely; but we should specially except two machines made by Messrs. R. Cuthbert and Co., of Leeming, Bedale, Yorkshire, a two-horse machine at 17*l.*, and a one-horse ditto at 14*l.*, Nos. 44 and 45 in the Catalogue, both of which proved very light in draught.

The reaper trials excited much interest, and during the first few days it was necessary to employ both horse and foot police, and retaining ropes, to keep the crowd back.

The weather was dry throughout, and with the exception of one or two days it was extremely hot; by the third and fourth day the Judges had fairly warmed into their work, and were to be seen conducting operations in a truly workmanlike manner.

The Stewards made renewed efforts to bring forward men and horses, in order, if possible, to bring the trials to a close by the end of the week, but all to no avail; the Judges suggested that it might be better to postpone the final trials until harvest, but the Stewards, after consulting together, deemed this course unsatisfactory, and ordered the trials to proceed on the following week, which was done, and the awards signed at 7 P.M., on Tuesday the 20th, thus terminating one of the longest contests which ever took place under the auspices of the Society. The Judges beg to tender their respectful thanks to the Stewards of Implements, for the attention paid to their comfort. The Judges would also record the extreme urbanity and patience shown by the Exhibitors in general during these prolonged trials.

The following list indicates the amount of prize-money offered in the five different classes of machines tested:—

REAPING MACHINES—

1. For the class of reaping machines, with self-delivery in sheaf, clear of the horse-track, 60*l.*
2. For the class of reaping machines, with self-delivery in swathe, clear of the horse-track, 60*l.*
3. For the class of reaping machines without self-delivery, 30*l.*
4. For combined reaping and grass mowing machines, 30*l.*
5. One-horse reapers, 30*l.*

We shall now proceed with the notes of the preliminary trials, beginning with Class No. 2, as it was found requisite to take the first machines that came forward.

SWATHERS.

No. 1799. The Beverley Company's 3-horse machine, price 42*l.*—The test was severe, as the half of the work was leewards—a term which will be employed throughout this report as meaning on the back of the corn, in the same direction as the wind at the time.

The stubble made by this pushing machine was high, but the swathe was neatly delivered, and, as it cuts 15 feet at a bout, much ground was soon gone over.

The Judges considered this implement as best fitted for large enclosures and during dry weather. The draught, as given by Mr. Amos, and his assistants Messrs. Williams and Purder, in the dynamometrical comparative test, is 71·4 against 87·6 of this Company's 2-horse reaper.

No. 3975. A. C. Bamlett, Vale of Mowbray, Thirsk, Yorkshire, 2-horse swather, price 36*l.*—This is Lord Kinnaird's improvement upon Bell, and it delivers the corn by means of straps and chains; the length of the connecting-rod is 12 inches; the fans are driven from an iron pole erected over the driving wheel and run with pitch-chain on the fan-shaft. The width of the cut is 6 feet, the length of the strokes $2\frac{5}{8}$ inches; the fingers are fitted with Bamlett's patent steel finger-plates, which give to the knives, besides the usual cutting power, the effect of a scissor action. As before noticed, this machine is fitted with patent oil reservoirs, and from the way in which it did its work the Judges booked it for a high place. Stubble and swathe were superb.

No. 410. John G. Rollins, Swan Wharf, London, American sheafer, price 30*l.*—Is ingenious, but complex; has five rakes, any number of which can be set at rest. It was not wanted for further trial.

No. 644. R. Hornsby and Sons, patent governor sheafer, (marked W), price 31*l.* 10*s.*—Cuts 5 feet 3 inches wide; connecting-rod 20 inches long; ungears from the seat; cuts very few heads off, being provided with a head-saver; has a skeleton knife, and in an unfavourable crop made excellent work; the driver, from his seat on the pole, ungears by means of an iron rod which comes along the pole as far as his foot.

This machine is entirely of iron, the driving-wheel of wrought iron; the arms of the rakes are made of iron tubes. The appearance of this machine excited general admiration; the lubricating arrangements were perfect, and the bearings remained quite cool during the trial. It was set down as A 1 in its prospects for a place.

No. 3937. Samuelson and Co., self-raking sheafer, price 27*l.* 10*s.*—Cuts 5 feet wide, and the throw of the knife is $2\frac{5}{8}$ inches. Length of the connecting-rod 22 inches. Ungears with a clutch-bar, and raises the cutters with a winch. It made capital work, sheaved neatly, and the draught appeared light.

No. 3724. J. and F. Howard, Britannia Works, Bedford, self-raking sheafer, price 30*l.*—Has two travelling-wheels, and is drawn by two horses. Made good work on two sides of the corn, but stuck at a furrow. It appeared a well-

made machine, and the Judges little thought at this time what its future place in the trials would be.

No. 165. Brigham and Bickerton, Berwick-upon-Tweed, Northumberland, sheafer, price 30*l.*—Has two rakes driven by a cam, segment, and quadrant. The rake did not seem to catch the corn easily, but kept a good hold when it got one. It made very scattered work.

No. 643. R. Hornsby and Sons, "Governor" self-raking sheafer (marked K), price 31*l.* 10*s.* (including a grinder for the knives).—The rakes of this machine are fitted with wooden arms, and the implement differs only from No. 644 (marked W) in so far as it has its cutter-bar on the opposite side, affording, with the K machine, facilities for cutting on either side, a great advantage in some crops. It made capital work, cutting and sheaving well. The draught seemed light, the bearings kept cool, and it immediately pointed to a high place in the trials.

No. 188. H. and G. Kearsley, Ripon, Yorkshire, combined sheafer and swather, price 30*l.*—This machine made very fair work, but the horses did not go well, and the cut was narrow.

No. 164. Brigham and Bickerton, Berwick-on-Tweed, two-raked sheafer, price 33*l.*—Did not sheave well, but cut fairly.

No. 645. R. Hornsby and Sons, "Progress" self-raking reaper, price 31*l.* 8*s.* (with extras).—Cuts 5 feet wide, and has four rakes driven by an upright shaft, geared at the cog-wheels. Did not work very satisfactorily, the driving work appearing to be too low down.

No. 173. A. J. Murray, 181, Albany Road, London, 2-horse pusher, price 50*l.*—The horses are yoked like "Bell's," but have shafts instead of chains. From its erratic proceedings this machine may be styled the "Harvest Velocipede," as it is steered with a T handle exactly like a bicycle. Mr. Murray, who took the helm himself, evidently could not steer, and after a few serpentine attempts he withdrew from the contest.

No. 178. Burgess and Key, Newgate-street, London, 2-horse screw-delivery swather, price 36*l.*—This machine has been improved to pass through gates; it is almost noiseless when at work; cuts 5 feet 3 inches wide, with a 3-inch stroke. The fast movements are supplied with oil reservoirs. The cutting of this machine was very good, and the draught appeared light; but the swathe was slightly imperfect.

No. 646. R. Hornsby and Sons, the Plymouth prize swather, price 31*l.* 10*s.* —The driver sits on an iron seat on the pole between the horses, which he has to leave on gearing. It made fair work on a light crop.

No. 52. Thomas Read, New Malton, Yorkshire, swather, price 25*l.*—Has a skeleton platform of wrought-iron, and a wheel running inside the parting-iron. Is simple, and ungears from the seat, but the swathing was bad.

No. 647. R. Hornsby and Sons, swather, price 31*l.* 10*s.*—Delivery aided by a roller driven by Weston's pulleys. The cutting was good, but the swathe not perfect.

No. 3938. Samuelson and Co., self-raker, price 25*l.*—Cuts 5 feet wide; throw of knife $2\frac{5}{8}$ inches; length of connecting-rod 1 foot. This 2-horse machine cuts from the left-hand side, and delivers the corn by revolving rakes, which can be altered into a back-delivery action if required. It made good work, sheaved neatly, and was evidently booked for a place.

No. 177. McCormack's Burgess and Key's self-deliverer in sheaf, price 33*l.* —Has a 9-inch connecting-rod and a 5-feet cut. Did not sheaf well at all, and looked heavy in draught, caused doubtless by the sagging action of its extra-broad raker.

No. 176. Burgess and Key's reaper, 30*l.*—Made rather better work than No. 177.

No. 3722.—J. and F. Howard, Bedford, combined mower and reaper, price

30*l*. and 37*l*.—Has improved oil fittings, and made good work in a heavy crop.

No. 4760. W. S. Underhill, Newport, Salop, 1-horse reaper, price 18*l*. 10*s*. —Has a sparred platform, seemed light in draught, and the sheaves were well delivered.

No. 411. Johnston's combined American reaper and mower, price 25*l*.—Worked with four rakes, and made very bad work. The machine was stopped and two rakes taken off without better success, and it failed entirely in the last round.

No. 3727. J. and F. Howard, Bedford, 2-horse reaping machine without self-delivery, price (with one knife-bar) 18*l*.—Has a tipping platform. It choked shortly after it started, and also got out of gear at the corner. The second round was very much better, no stoppages being required, and the sheaves, in a heavy crop, neatly made except when working leewards.

No. 1975. Picksley, Sims and Co., 2-horse reaper, price 18*l*.—Has a sparred platform and pole.—This machine, like all others exhibited by this firm, seemed very compact and well built, chiefly of iron. It did very well the first and second round, but the platform was then altered, after which the cutting was only moderately good, the horses going very badly.

No. 3940. Samuelson and Co., combined self-raker, price 36*l*.—Made very good work, but cut off a few heads owing to the way in which the crop was swung; a head-saver was put on, but still a few heads were cut. The sheafing was superior even to manual work.

No. 3721. J. and F. Howard, Bedford, combined 2-wheel reaper and mower, price (with one knife) 23*l*.—The frame-work of this machine is of iron, and solid; the gearing is simple and compact, has a sparred tipping platform, and carries a spare knife-bar very neatly on the pole. The work was superb on all except the lee side. The change to a mower is very simple.

No. 470. J. and F. Young, Ayr, N.B., 2-horse double road-wheel manual delivery reaper, price 30*l*.—This machine cut no ears off, but failed entirely to work leewards, which the exhibitor frankly confessed he never attempted to do with this machine. It seemed, however, a thoroughly well-made implement.

No. 42. William Harkes, Knutsford, Cheshire—a new implement, as described in the introduction to this report.—It is made to cut either right or left, to suit the way the corn is lying. The width of cut is 4 feet 3 inches. Price 25*l*. The cutting was moderately good when going against the lie of the corn, but the reverse cutting leewards.

No. 1977. Picksley, Sims and Co., 1-horse combined reaper and mower, price (with three knives) 20*l*.—Fitted with a pole for two light horses; cut and delivered well in a thin crop. A well-made machine.

No. 482. Walter A. Wood, 77, Upper Thames Street, London, E.C., combined mowing and reaping machine, with side-delivery, price (with two knives and all extras) 22*l*.—This machine, chiefly constructed of wood, has two wheels, only one driving, cutter-bar jointed for grass, rigid for corn; smooth knife for grass, serrated for corn.

The appearance of this machine, in the midst of a large crowd of people, excited universal attention; it was drawn by a pair of light thoroughbred horses adorned with carriage harness and small American and English flags at the horses' ears; the driver was the picture of an American athlete, and the entire turn-out seemed as if it would "whip creation." Mr. Griffin, representing Mr. Wood, of New York State, was evidently disappointed at the difficulty he experienced in attempting to cut and deliver this half-ripe rye. The machine was stopped and a rake taken off, after which it worked a little better. The opinion of the Judges, however, was, that whatever eminence Mr. Wood's machine has attained on the other side of the Atlantic, it has

to be greatly altered before it can cut English crops to perfection. Mr. Griffin, seeing that he was beaten, returned to the charge almost immediately with No. 479, improved 2-horse mowing machine, having a reaper attachment, which made much better work during a short trial.

No. 43. R. Cuthbert and Co., Bedale, 2-horse Hussey's reaper, price (with 1 knife-bar) 17*l.*—The driving-wheel of this machine is boxed-up and the horses worked tandem; the sheaves are pushed off by hand. Both cutting and sheafing were perfect.

No. 3939. Samuelson and Co., manual delivery 2-horse reaper, price 17*l.* 10*s.*, —Delivers the sheaf by hand from a drop-platform; it made splendid work, and was very noiseless. The Judges ordered it to cut a piece of corn into two where no road was made for it, which it accomplished without a check.

No. 192. H. and G. Kearsley, Ripon, Yorkshire, 2-horse combined machine, price 24*l.*, has all its working parts encased in iron, with jointed finger-beam. The cut was only 4 feet, but both it and the sheafing were remarkably good.

No. 48. W. Wray and Son, Bedale, 2-horse manual reaper, without self-delivery, price (with 2 knives) 17*l.*—This machine has a sparred drop-platform; the sheafing was capital.

R. Hornsby and Sons, combined reaper and mower, price 21*l.*—A beautiful machine, and made excellent work.

No. 191. H. and G. Kearsley, Ripon, 2-horse combined reaper and mower, price 30*l.*—Cuts 4 feet 6 inches; good both in cutting and sheafing.

No. 1711. Beverley Company's 1-horse manual reaper, price 14*l.* 10*s.*—Cut badly to leewards, otherwise worked very well.

No. 4308.—William Mattison, Leamingbar, Bedale, new left-hand reaper, price 12*l.* 10*s.* (as referred to in our Introduction).—Made very good work indeed.

No. 45. R. Cuthbert and Co., 1-horse Hussey reaper, price 14*l.*—Made very fair work, and the draught appeared light.

No. 189.—H. and G. Kearsley, Ripon, 1-horse manual reaper, price 16*l.*—Mounted on an iron frame; made capital work in every way.

No. 59.—W. Brenton, Cornwall, patent cylinder reaper, price 20*l.* (as referred to in the Introduction).—Made really good work at this trial.

No. 304. Fosters and Son, Essex, new implement, price 16*l.* (as referred to in the Introduction).—Made very inferior work in every respect; at the same time the construction is very simple, but the friction is great.

No. 649. R. Hornsby and Sons, "The Paragon" combined reaper and mower, price 22*l.*—Is a right-handed machine, which the crop favoured, and it made capital work.

No. 4307. William Mattison, Bedale, right-hand 1-horse reaper, price 12*l.* 10*s.* (with 2 knives).—Cuts 4 feet 9 inches; did not work well to leewards.

No. 1974. Picksley, Sims, and Co., 1-horse reaper, price (with tool-box and 2 knives) 15*l.* 15*s.*—This is a superior machine, and the work (iron) all well covered in; worked well.

No. 1536. Hunt and Pickering, of Leicester, 1-horse reaper (with 2 knives), price 18*l.*—Has a sparred platform, worked with a spiral spring, and Bamlett's finger-plates. Did not work well.

No. 60. William Brenton, Cornwall, machine similar to No. 59, but lighter. —The roller worked well on one side, but did not appear to any advantage working leewards.

No. 3943. Samuelson and Co., Banbury, 1-horse reaper, price 15*l.* 10*s.*—Arranged with shafts and drop-platform for manual back delivery; made most perfect work, and looked light in draught. It has a swathing attachment, price 1*l.* extra.

No. 653. R. Hornsby and Sons, "Premier" 1-horse back delivery reaper,

price (with 1 knife) 14*l.* 10*s.*—The appearance of this machine, as formerly alluded to, is almost unequalled. The platform is a drop sparred one, and the width of cut is 4 feet 6 inches. It made superb work. Messrs. Hornsby's rake was certainly better handled than many others in the field.

No. 165. Brigham and Bickerton, combined reaper and mower, price 21*l.* and 26*l.*—Has a zinc platform, and cuts 5 feet 3 inches; made very good work, but was evidently much indebted to an expert hand at the rake.

No. 471. J. and F. Young, Ayr, manual reaper, price 21*l.*—Has an open platform, and cuts 4 feet 3 inches; cutting was good, but sheaves not well delivered.

No. 58. William Brenton, Cornwall, 2-horse machine, price 25*l.*—Cut well, but delivered badly.

No. 46. Cuthbert and Co., 1-horse Hussey's reaper, with wooden frame, price 14*l.*—Made superb work.

No. 3726. J. and F. Howard, Bedford, 1-horse back delivery reaper, price 16*l.* 10*s.*—Stopped after going thirty yards, and went badly to leewards, the grain lodging on the platform.

No. 648. R. Hornsby and Sons, "Premier" 2-horse back delivery reaper, price 15*l.*—Width of cut 5 feet. A most perfect implement and beautifully handled, making some of the best work seen at the trials.

No. 1976. Picksley, Sims, and Co., 2-horse combined mower and reaper, price 24*l.*—Did not deliver well going leewards, and sheafed badly.

No. 1712. Beverley Company's 1-horse reaper, with semi-manual sheaf-delivery, price 16*l.* 10*s.*—Choked, and would not work. The arrangements in the machinery of this implement would require the crop never to vary in thickness.

No. 483. Wood's improved 1-horse reaper, price (with 1 knife) 14*l.* 14*s.*—One driving and one idle wheel; cut well, but sheafed badly.

No. 3941. Samuelson and Co., combined 2-horse reaper and mower, price 21*l.* 10*s.*—Made very good work, both against the wind and with it.

No. 179. Burgess and Key, combined 2-horse reaper, price 22*l.*—The crank is on a level with the knife, and the oiling arrangements are perfect; it cut well, but delivered badly.

No. 50. William Wray and Son, Bedale, 1-horse reaping-machine, without self-delivery, price (with 2 knives) 10*l.*—This machine has a wooden frame; it stopped once, and went very coarsely. This was the cheapest machine in the Catalogue.

No. 167. Brigham and Bickerton, 2-horse manual reaper, price 20*l.*—This machine cut well, but the draught looked very heavy.

No. 654. R. Hornsby and Sons, 1-horse reaper, price 17*l.* 10*s.*—This machine has an iron platform, and worked well on three sides.

This was the last of the preliminary trials, as it was found impossible to continue them any longer. It was resolved to begin the measured plots. The following tables show the class of machines, the time taken, and the dynamometrical test of comparative excellence, as likewise the final trials and awards.

Our Awards are given at length with those of the other Judges of Implements (p. lxxv.).

Wm. Sadler.
Wm. Sanday.
John Hicken.

DYNAMOMETER TRIALS OF REAPERS.

SHEAF DELIVERY.—CLASS I.

Name of Firm.	No. of Implement.	Time.	Mean Draught.	Width Cut.	Comparative Excellence.	
			lbs.			
Hornsby and Sons	644	1 27	284·2	4 9	59·8	
Ditto	642	0 57	295·4	5 0	59·08	
Samuelson	3938	1 40	308·0	5 0	61·6	
Hornsby and Sons	643	1 23	303·8	5 0	61·76	
Samuelson	3937	1 18	311·6	4 6	69·2	
Hornsby and Sons	645	0 55	233·8	4 3	55·0	
Burgess and Key	176	1 19	337·4	4 6	74·9	
Brigham and Bickerton ..	164	1 23	306·6	4 9	64·5	

SWATHE DELIVERY.—CLASS II.

Bamlett	3975	0 50	330·4	5 8	59·0	
Burgess and Key	178	0 45	336·0	5 3	64·0	
Hornsby	646	1 0	334·0	4 10	69·1	
Beverley Iron Company ..	1709	0 52	536·2	7 6	71·4	For 3 horses.
Ditto ..	1707	0 58	452·2	5 2	87·6	

TWO-HORSE, MANUAL DELIVERY.—CLASS III.

Hornsby and Sons	648	1 0	170·8	4 4	39·7	
Bamlett	3981	0 50	213·0	5 5	39·3	
Samuelson	3939	1 0	176·4	4 0	44·1	
Cuthbert	43	1 12	245·0	4 4	56·9	
J. and F. Howard	3727	1 5	193·2	4 0	48·3	Not sent for final trial.
Picksley and Sims	1975	Not in Mr. Amos's list.				
Brenton	59	1 10	215·6	4 7	47·8	

ONE-HORSE, MANUAL DELIVERY.—CLASS V.

Bamlett	3980	0 53	172·2	5 1	33·8	
Hornsby and Sons	653	1 10	179·2	4 3	42·1	
Cuthbert	45	0 59	182·0	4 2	43·7	
Brenton	60	0 54	235·2	4 0	58·8	
J. and F. Howard	3726	0 58	260·4	4 0	65·1	
Samuelson	3943	0 55	214·2	4 2	51·4	
Picksley and Sims	1974	1 1	274·4	4 1	67·2	
Bamlett	3987	1 2	231·0	4 1	56·6	
Wood	483	Not in Mr. Amos's list.				

The following Tables show the time occupied by each machine in cutting a measured quantity of rye; but we did not consider this a very important element in making our awards:—

Class I.

Quantity cut, ½ acre.

Number.	Name.	Time. Min.	Time. Sec.
644	Hornsby and Sons	26	0
642	Ditto	30	0
3938	Samuelson	26	0
645	Hornsby and Sons	24	0
643	Ditto	21	30
3937	Samuelson	29	0
176	Burgess and Key	27	0

Class II.

Quantity cut, ½ acre.

3975	Bamlett	18	30
178	Burgess and Key	21	0
646	Hornsby and Sons	23	0
1709	Beverley Iron Company, 3-horse, ¾ acre	27	0
1707	Ditto	22	50

Class III.

Quantity cut, ¼ acre.

648	Hornsby and Sons	12	0
3981	Bamlett	10	5
3939	Samuelson	12	0
1975	Picksley and Sims	13	35
43	Cuthbert	13	0

Class V.

Quantity cut, ¼ acre.

3980	Bamlett	10	0
653	Hornsby and Sons	13	10
45	Cuthbert	12	15
3943	Samuelson	11	0
1974	Picksley and Sims	14	0
483	Woods	17	30
3987	Bamlett	11	45

2. *Report of the Judges on Mowing-Machines.*

We have to report on a class of implements which has now become quite a necessity in ordinary farm practice, and it is a pleasant duty to describe machines which, in a comparatively short time, have attained a degree of practical efficiency equal to that of any other agricultural implement, and which supply a real want of the British farmer. A comparison of the present entries with those at Plymouth in 1865, when similar machines were tested, gives the following result:—

	Two-horse Mowers.		One-horse Mowers.		Combined Machines.	
	Exhibitors.	Machines sent to Trial.	Exhibitors.	Machines sent to Trial.	Exhibitors.	Machines sent to Trial.
Plymouth, 1865 ..	..	13	..	..	..	8
Manchester, 1869	17	23	9	9	11	20

We commenced our duties on Monday, July 12th. Furnished with a list of the Exhibitors who were desirous of competing, we started on a voyage of discovery, or, more correctly, a tour of inspection. In some cases no information was procurable, owing to the absence of the representative. In others the Exhibitors being "at home," would press their claims strongly to send two or three implements in the same class, upon the ground of often trivial differences in construction. The whole of the first day, with the exception of an hour, spent in viewing the trial fields, and giving orders to the surveyor, was thus, as we venture to submit, wholly and unnecessarily wasted, and we beg respectfully to confirm the opinion expressed by the Judges at Plymouth, and suggest the necessity for some more systematic plan being adopted in the future. A shed in the trial field, or in close proximity to it, in which the machines intended for trial might be arranged in classes before the Judges commenced their inspection, appears to us to be an arrangement that would lighten the work alike of Judges, Exhibitors, and all connected with the trials.

Two-Horse Mowers.

On Tuesday morning, on our arrival at the trial field, on Mr. Cookson's farm, we proceeded at once to draw lots for plots, and the trials commenced at 10 o'clock. Time was taken of the start and finish of every machine, and of stoppages, with notes of their causes, our object being to reduce the large collection to a manageable form, by getting rid thus early of the less perfect machines. The grass selected for this preliminary trial, was apparently an old pasture recently renovated, the young grasses growing to a good height, but without that closeness at the bottom which generally characterizes old pastures. It was a fair crop, and, perhaps, proved quite as difficult to cut as it looked, for while some machines went through with ease, others soon got into difficulties. This field was set out in half-acre plots; and it was evident that our object would be attained, as the character of the work done, and the construction of the machines, were sufficiently manifest to enable us on this trial to reduce the list from 23 to 11. Many of the rejected were very useful machines, but wanted the finish and perfection of detail which characterized their more successful opponents, most of whom had the advantage of a more lengthened experience. We trust that the unsuccessful may have gained experience by the trials. Defects are often invisible at home; and we believe

that not the least benefited are the unsuccessful candidates, if only they are sufficiently open to learn a lesson. As a detailed description of these rejected machines would unnecessarily lengthen this Report, we will content ourselves by giving an account of the working of the 11 machines selected for second trial; a list of which we here subjoin, with a table of the dynamometer-trials (See next page).

In consequence of the remaining uncut grass on Mr. Cookson's farm being light, and not sufficiently difficult of cutting to test the capabilities of these best machines, we were obliged to apply to the Stewards for assistance; and we have to thank those gentlemen, and the Local Committee, for at once supplying our wants, by securing and placing at our disposal a large field of old grass, on Mr. Bannister's farm, which perfectly answered our purpose. We must also thank Mr. Bannister for the prompt manner in which he had our wishes carried out.

We again set out half-acre plots for the 11 machines, and lots were drawn as before for places; and in order to test them more fully, a heavy roller was drawn twice across the plots at either end.

Plot 1 fell to Messrs. Samuelson's No. 3934 (new implement).—One of the objects aimed at in this machine is to take the weight off the horses. This it is proposed to effect by attaching the whiffle-trees to a bar placed below the pole, and connected to it by a sliding-attachment. To the bar a draft-chain is made fast, this chain passes over a pulley fixed to the under side of the pole, then under another pulley carried by the framing, and the chain is fixed to a pendent-arm formed on the framework, by which the pole is carried; by these means the draft tends to raise the pole. The draft of the horses would also have a tendency to raise the knife in the event of its coming in contact with any inequalities in the field. This machine went through its first trial in good form, cutting low, level, and well. In the second trial an accident occurred to it, through a piece of iron being caught in the knife, breaking a section, and at the same time causing the hinge-cup of the main-shoe to be forced from its socket. This was replaced, and the machine was at work after four minutes' delay. It went through its trial in a satisfactory manner, and we have every reason to speak in praise, both of its mechanical construction, and also of its practical working.

Messrs. Hunt and Pickering, No. 1833.—The framing of this machine was of wrought-iron, principally rivetted together, but some parts were bolted on. The shafts and the connecting-rod are stated to be made of steel, and generally the machine was well made. This machine took the next plot, but its work done here was not equal to that in the first trial. The cutting was uneven and too high, and the inferiority of the work was still more apparent where the grass had been rolled. The cutter-bar has moveable steel bits, placed on malleable cast-iron fingers. The knife works in these bits clear of the bar. The bits can be exchanged when required, so as to retain sharpness in the cutting parts.

Mr. A. C. Bamlett, No. 3971.—The framing of this machine is very simple, and there is an arrangement of a pair of levers, by which the frame that carries the knife can be readily raised, lowered, or canted. This machine made good and level work in its preliminary trial. In the second trial on more difficult ground it worked steadily, but the cutting was not sufficiently low to test its powers of working on unlevel surfaces, nevertheless, we consider this to be a good serviceable machine, with many good points in its mechanism.

Messrs. Hornsby and Sons, Patent Paragon Mower, No. 636.—The framing of this machine is principally of cast-iron, as are the rims and bosses of the bearing wheels. The spokes of these wheels, however, are of wrought-iron. The various nuts in the machine are made with a simple locking arrangement to prevent them from becoming loose.

TABLE SHOWING DRAUGHT OF TWO-HORSE MOWERS.

Exhibitors' Names.	Number of Article.	Width cut.		Length of cut in feet.	Time of cutting.	Speed in miles per hour.	Quantity cut per hour.			Horse-power.	Draught in lbs. per 1 foot wide=units of work per 1 foot square.	Draught in lbs. per 1 foot cutting edge knife running idle.	Remarks.	Price of Machine.	
		ft.	in.	ft.	min.		A.	R.	P.					£	s.
Burgess and Key	174	4	0	237	1	2·69	1	1	8	1·92	67·0	27·0	Rather high cut.	18	0
W. A Wood	478	4	0	259	1	2·94	1	1	28	2.09	66·7	20·3	Moderately low and level.	17	0
W. A. Wood	480	4	0	244	1	2·77	1	1	15	1·34	45·22	13·1	Rather high cut.	17	10
R. Hornsby and Sons ..	636	4	0	246	1	2·79	1	1	16	2·54	85·4*	18·72	Low cut, good work.	18	0
R. Hornsby and Sons ..	638	4	2	273	1	3·1	1	2	10	2·47	71·8	14·2	Moderately low.	17	10
Hunt and Pickering ..	1833	4	4½	253½	1	2·86	1	2	3	2·8	83·5	Not taken.	Not cut low enough.	22	0
Picksley, Sims, and Co...	1967	3	10½	227	1	2·57	1	0	33	2·61	98·0	32·5	Moderately low and level.	18	10
Samuelson and Co.	3934	4	0	264	1	3·0	1	1	32	2·32	72·5	23·8	Cut very low, and good.	17	10
A. C. Bamlett	3968	3	10	257	1	2·92	1	1	16	3·0	101·2	32·0	Moderately low and level.	22	0
A. C. Bamlett	3971	4	1½	226	1	2·56	1	1	8	2·23	78·7	23·5	Same as foregoing.	20	0
J. &. F. Howard	3719	4	0	243	1	2·76	1	1	14	1·84	62·75	22·5	Cut moderately low and level.	20	0

* This machine having been tried cutting ¾ of an inch higher than in the first trial, gave in this column 68·81, showing that in looking over this table, some allowance should be made for difference in height of cut.

When the machine is merely travelling and not working, the first pinion can be thrown clean out of gear from the spur-wheel, so that there is not any gearing whatever running at such times. The knives are not only secured to the knife-bar, but are locked one to another by projections and recesses.

The end of the finger-bar is supported on a wheel, which can be adjusted by a species of face-clutch arrangement, such as is used in adjusting the height of hay-making machines. The draft is taken by a draft-rod attached to the machine, in such a position as to counteract the tendency to side-way pressure on the bosses, caused by the resistance due to the passage of the knife through its work.

In the first trial this machine had a short plot which involved much turning, but the work was, nevertheless, done in a masterly style. Again, in the second trial, the most unlevel and worst cutting piece in the field fell to its lot, but the knife adapted itself to the uneven surface, cutting the grass in the most perfect manner. In the working of this machine the gearing follows the previous track of the swathing-board, and the knife will work at any angle,* the hinge of the cutter-bar being in a line with the crank-axle. The swathing-board can be altered to any angle required. It is altogether a splendidly constructed machine.

Mr. W. A. Wood, No. 478.—All the working parts appear to be well designed and well manufactured; the framing of the machine is of wood. This is undoubtedly a valuable machine. It went through its trials in excellent style, making level and good cutting, and the draught is also exceedingly light. This machine by chance fell into light and easy plots; for which reason we had it taken to some unlevel ground by the side of Messrs. Hornsby's plot, in order to test its capabilities in more difficult work. Here again the cutting was remarkably well done, the machine showing great adaptation to uneven surfaces. In this machine a peculiar slipper-shaped finger was used, which we think gave it an advantage in these trials, as it admitted of a lower cut being made without the danger of the points penetrating the ground.

Mr. W. A. Wood's Imperial Mower, No. 480.—The framework of this machine is of cast-iron, the bearing-wheels are of large diameter, and a great novelty in it is that the bearing-wheel next the knife has not any arms or spokes, but is a mere ring; this ring is bored out to run on three friction rollers, carried at the extremities of three arms of a casting fixed to the framework, and resembling very much the arms of the Isle of Man; advantage is taken of this arrangement to bring the connecting rod for working the knife, and also to bring the attachment for the knife and finger-bar, through the bearing-wheel itself. The idea is ingenious, and most certainly, so far as the mere dynamometrical test goes, successful; for this machine exhibited, both at work and when tried with the knife running idle, the lowest draft of any machine tested. The draft, however, when running idle was only 1·1 lbs. less than Hornsby's 638. The draft when cutting was extremely low. It is a matter yet to be ascertained how far the friction rollers on which the bearing-wheel is supported will stand constant usage and the introduction of grit or other foreign substances. In this machine there was a very ready arrangement for altering the height of the knife at either end, so as to adjust it to the variations in the ground. Notwithstanding its merits in these respects, we were not favourably impressed with it. The cutting not being so low as that of many others may account in some measure for lightness of draught.

Messrs. J. and F. Howard's British Mower, No. 3719.—This machine went through its trials satisfactorily so far as regards cutting. We could not but

* Literally at any angle; for it can be made to trim the side of a ditch, or to clip a hedge.

notice the great vibration and noise in some parts of the gearing during work. Messrs. Howard's machine chancing to come on light plots for trial, was afterwards put on some unlevel ground where it made fair work, but did not adapt itself well to the inequalities of the ground.

Messrs. Picksley, Sims, & Co., No. 1967.—This is a strong machine, with working parts well protected. It made good cutting in its first trial, but being unable to adapt itself to ridge and furrow, the ground was sometimes ploughed in its second trial where the land was unlevel. The dynamometer test also proved the draught to be heavy.

Messrs. Burgess and Key, No. 174.—When this machine is merely travelling, a clutch lever, which operates in both directions, throws out the gearing, so that there is nothing running but the bearing-wheels. The pinions are secured on to their shafts by the plan of cutting in each pinion-boss a thread, so as to make the boss act as a nut to screw on to its shaft, which is formed with a thread to receive the boss. It is said that this plan answers perfectly well, that the threads do not gull nor the wheels become loose, and no doubt it has the advantage claimed for it by the exhibitor, that the least skilful of farm labourers in mechanical matters can unscrew one wheel if broken, and replace it by another. The swathing board is made in two parts in its height, and can be adjusted to varying altitudes as may be required. Generally the construction of this machine is good, the gearing is placed outside the wheel, and follows in the track of the swathing board. The connecting-rod is short, and on a level with the knife. The brackets, holding gear, spindles, crankshaft, and gearing are all duplicated; and the whole can be replaced for 2*l.*, so that in cases of accident or injury occurring to any one of these parts, it can be replaced at a cost of a few shillings. This machine did its work level and well, perhaps not cutting so low as some others (more especially in the dynamometer tests, when all attempts to lower it failed), but working with uniformity and steadiness throughout. The plan adopted for keeping the machine constantly lubricated by means of small bottles of oil, protected by iron cases and placed over the bearings, appears to be good.

Messrs. Hornsby and Sons' New Manchester Mower, No. 638.—This machine had the wrought spoke bearing-wheels, the nut-locking arrangement, and the draft attachment of No. 636. It has not, however, the short connecting rod and corresponding position of hinged joint which that machine has, and the knife therefore of 638 can only be worked within the ordinary range of angle up or down at which the generality of machine knives can work, but the machine is as thoroughly excellent as regards the workmanship as the machine No. 636. The draft, especially in the trial when the friction of the machine alone was taken, was extremely small. The machine works remarkably well, but the near wheel runs continually on the swathe last cut. The horse also walks on the grass more or less. This we consider to be objectionable.

Mr. A. C. Bamlett, No. 3968.—This is a strong serviceable machine, suitable to any crops. The large swivel-wheel in front takes the weight from the horses' shoulders, and there is a compensating action by which the position of the knife-bar may be altered during progression. The fingers are made so as when fixed to leave side by side openings below the knife-bar. This is stated to obviate any risk of choking. There is also a good arrangement for oiling the crank and the knife bearings. This machine made level and good work, and taking into consideration its strength and cutting capabilities, and the good arrangements for raising the knife-bar, and altogether its adaptation to unlevel fields and heavy crops, we cannot but speak of it in favourable terms, notwithstanding its heavy draught.

Our awards in this class were as under :—

Richard Hornsby and Sons, No. 636, Prize of 20*l.*
Walter A. Wood, No. 478, Prize of 17*l.*

Burgess and Key, No. 174, Prize of 13*l.*
Samuelson & Co., No. 3934, highly commended.
A. C. Bamlett, No. 3968, commended.

One-Horse Mowers.

In this class nine competitors came into the trial-field and went through their trials; but the only point we shall allude to in regard to the working of these machines is the *draught.* Although the grass upon which they were tried was light and easy to cut, being composed of rye-grass and other stemmy grasses, the distress of the powerful horses working the machines became such, in the space of ten or fifteen minutes, as to be apparent to the most casual observer. Among all the machines, Mr. Wood's worked with the greatest ease and probably with the lightest draught. But even this in ordinary grass mowing would prove too much for a single horse to work sufficiently long at one time to be practically useful.

What we have above stated will be more readily understood when it is explained that for *half* the horse-power reduced the cutter-bar is only shortened about *one-sixth*; and in many cases the substitution of this one-sixth shorter knife-bar, with a shorter finger and section, is the only alteration made in converting a *two-horse* into a *one-horse* mower. We can only repeat what we stated in the Show-yard at the time of making our awards, "that we are of opinion that all the machines exhibited under the title of one-horse mowers are far too heavy in draught to be worked by one horse; and we therefore, under Clause 3 of our instructions, withheld the sum assigned for prizes in this class."

Combined Reaping and Mowing Machines.

As the machines which competed in this class were in principle almost the same as those exhibited by the same makers as two-horse mowers, and in many cases were, in fact, the same machines, we need not here enter again into details of their working as mowers.

As combined machines, they were, on the whole, useful implements, working satisfactorily both in the grass and in the rye. In some instances the machines were worked as reapers by one horse only, but in every case two horses were used for grass cutting. It may be easily understood that although the draught of a mower cutting 3 feet 9 inches in width of grass (which requires to be cut low, and is thick at the bottom) may be too heavy for one horse, yet a reaper cutting a moderate width, and from 3 to 4 inches from the ground, with the speed of knife reduced 25 per cent., may be easily worked by one. We presume that these combined machines are intended to economize farm capital, and also to supply small occupiers, at a moderate cost, with a convertible implement adapted to cut both his grass and his corn. But it appears to us doubtful if in general farm practice there would be much economy in purchasing one of these, seeing that for an outlay of about 25 per cent. more money two separate and perfect machines may be had. Undoubtedly, there are many occupiers of small or medium-sized farms, who would gladly avail themselves of a machine which would accomplish both mowing and reaping at a saving in outlay of 9*l.* or 10*l.*, and there are seasons when a large breadth of corn requires to be cut in haste, and a machine of this kind might be brought into requisition on large occupations.

In making our awards we considered that one of the principal ends of machinery is the saving of manual labour, and we therefore gave the first place to the most perfect machine in the class, namely, to Messrs. Samuelson's No. 3940, a combined self-raking side-delivery in-sheaf machine. This worked exceedingly well, both in the grass and in the corn, and delivered the sheaf clear of the horse-track. The second place we gave to Messrs. Hornsby's

DYNAMOMETER TRIALS OF COMBINED MACHINES (AS MOWERS).

NAME.	Number.	Width of cut in feet.		Length of cut in feet.		Time of cutting.	Speed in miles per hour.	Quantity cut per hour.			Horse-power.	Draught in lbs., and units of work per 1 foot cut.	Draught in lbs. per foot cutting edge knife running idle.	Remarks	Price.	
		ft.	in.	ft.	in.	secs.		A.	R.	P.					£	s.
Burgess and Key	179	4	0	186	0	47	2·69	1	1	9	1·94	70·3	28·0	Very good work.	22	0
Kearsley	191	4	2	189	0	43	3·0	1	2	2	2·6	82·1	37·4	Very good work.	30	0
Wood	476	4	1	210	0	53	2·7	1	1	14	1·86	63·3	26·4	Good work, and properly cut.	17	10
Hornsby	649	4	4½	192	0	45	2·91	1	2	7	2·15	67·7	20·3	Fair work.	22	0
Picksley, Sims, & Co. ..	1977	3	10	201	0	47	2·9	1	1	16	2·42	81·3	26·0	Cut not quite so clean as 476.	20	0
Howard	3721	4	2	187	0	50	2·55	1	1	6	1·88	67·7	19·4	Work regular, but not quite so regular as 3722.	23	0
Howard	3722	4	1½	180	0	46	2·67	1	1	13	1·86	63·4	28·5	Very good work.	37	10
Samuelson	3940	4	6	184	6	43	2·92	1	2	15	1·85	54·0	21·0	Fair cut.	36	0
Bamlett	3982	4	6	188	6	47	2·73	1	1	39	2·55	80·0	22·2	Very good work.	32	0

No. 649, a combined mower and manual back-delivery machine. This is a very cheap and exceedingly well-made machine; it did its work well in grass and corn, and on small occupations, to which these machines are more particularly adapted, would prove a very useful implement. The back-delivery machines, costing only 4*l.* in addition to the price of a simple mower, will probably be the most extensively used as combined machines, and we thought it right to award a prize to one of these.

We were very favourably impressed with the working of No. 3722, a combined mower and self-acting sheaf-delivery machine, sent by the Messrs. Howard.

Messrs. H. and G. Kearsley's combined mower and manual back-delivery reaping-machine, No. 191, made good and clean work on the rye, also cutting good on the grass. The price, 30*l.*, we considered high for a back-delivery machine.

Messrs. Picksley and Sims's machine, No. 1977, made excellent work in both trials, as did also his No. 1976.

Mr. W. A. Wood exhibited a machine with automatic side-delivery, price 37*l.* 10*s.*; it did its cutting well, but the sheafing was not good.

Messrs. Burgess and Key's machine, No. 179, went through its trials in the most workmanlike manner.

The 30*l.* which we had to dispose of we awarded as under:—

To Messrs. Samuelson and Co., No. 3940, prize of 20*l.*

To Messrs. Hornsby and Sons, No. 649, prize of 10*l.*

J. W. Kimber.
John Hemsley.
Matthew Savidge.

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3. *Report of the Judges on Haymakers, Horse-Rakes, and Hay Collectors.*

Haymakers.

In the class of Haymakers we have machinery only second in importance to the Mowers. The saving of labour by the use of them in the processes of haymaking is great, and not only is there economy of money but, what is decidedly more important, of time. In these days, moreover, it is often impossible to obtain the hands necessary to manipulate the hay. Now that mowing by machinery is so established a practice, our haymakers may well be constructed with a view to deal with the grass as it is left by the machine: and there is this difference: in the case of the scythe the grass is collected into a heavy swathe, from which it can only be distributed by fast forward or tedding action: in the case of the mowing-machine, the grass, unless brought together by the track-clearer, falls where it stood, and is distributed over the surface. When the crop is light and the weather fine, it may be that tossing right over is not necessary or desirable; the slighter kick up behind being sufficient to spread, and not so likely to break off the delicate leaves of clover, &c.; hence a good back action is very important. Again, it is manifest that in order for the same machine to act efficiently in light and heavy crops, the revolutions of the forks must be varied; and unless the machinery is capable of adjustment, this can only be effected, and then but imperfectly, by regulating the pace of the horse, and a loss of result must follow. If we reduce the pace, less ground can be gone over, or if we require a greater speed than that for which the machine is constructed, we can only obtain it by calling upon the animal to travel at a pace not natural and therefore distressing. In reference to the same crop, difference of speed is desirable according as the material is grass, hay, or in the intermediate stage. For these reasons haymakers capable of a change of speed, provided the same be produced without undue complication, are decidedly commendable. Strength of construction is also of great importance. The

machine must be equal to the heaviest work, and the working parts must be so constructed that the tendency to clog from the grass settling on the machine and winding round the spindle is reduced to the minimum. For the first time, we find two of the machines with the fork spindle placed in a direct line between, and not behind, the wheels; there is in this arrangement an element of strength, and an opportunity for simple adjustments commending our approbation; also a greater ability to act across ridge and furrow, inasmuch as the wheel and the forks pass the lowest ground at the same moment. It may be urged that whatever advantage is thus gained will be met and counterbalanced by the wheels holding the grass, especially in long crops, and preventing the forks nearest to the wheels taking up the grass: to a certain extent this may be so, especially when the haymaker is employed in the same direction as the mower; but practically the effect is nothing like so apparent as would be imagined, probably because the nearest tynes are from 9 to 10 inches from the wheel. After a very careful observation we are decidedly of opinion that this is not a material disadvantage of sufficient importance to weigh against the solid advantages attained by the direct spindle; and we anticipate that ere long this arrangement will be more general than the older plan. The crank spindle is not so strong, and is liable to become strained from the teeth coming in contact with the ground, to which they would have been less liable if working from a direct central axis. At the Society's Plymouth Meeting, when similar machines were last tested, the Judges awarded the prizes to the smaller and cheaper haymakers, as being suitable to small occupations; we did not endorse this view, for two reasons; first, because we thought it very important to have a strong machine capable of dealing with the heaviest crops, which the lower-priced implements are unequal to; and secondly, because the larger machines, covering from 6 to 9 inches more surface, are in reality the most economical; as more work can be performed, which pays well for the extra cost. In giving the prizes to the larger and more costly machines we do not disparage or condemn the cheaper.

Ten machines were entered for competition, we carefully examined each as to its construction and strength: then gave it a run in both directions, and so reduced the list to those shown by Messrs. Howard, Mr. Nicholson, and Messrs. Ransomes and Co. A short description of the various machines as they came before us may be deemed interesting.

Mellard, Southwell, and Co., Rugely, showed a tolerably well-made machine which closely resembled in its arrangements Howard's original. The plan of lowering the fork-spindle by shifting a pin in the front frame was neither simple nor likely to keep long in order. The speed of the back action was considerably reduced by the teeth of the different revolutions being as 12 to 17. The grass was not picked up properly, and in turning at the ends the machine clogged.

Mr. W. H. Nicholson, Newark, exhibited 2 machines. They are, as will be seen, very similar in construction. The smaller one, price 13*l*., has 3 speeds, 2 backwards and 1 for tedding. The arrangements for throwing in and out of gear are very simple. In the larger machine, price 16*l*., a second speed for the tedding or forward motion is secured by a simple addition of gearing. The centre of each travelling wheel is fitted with an ordinary spur wheel and an internally geared wheel, the difference in the diameters of the two being represented at the pitch line by 12″·25 for the spur wheel, and 19″·25 for the internal wheel. The motive power is transmitted from either to the fork barrel by means of a flying pinion, the distance between the 2 wheels being somewhat greater than the thickness of the flyer, so that when slid between the two, the fork barrel is out of gearing; for work, the flying pinion is slid in the main axle into either set of gear according as a forward or backward motion is desired, and is held in its place by a simple catch. When it is desired to use different speeds from those obtained as above, a carrier pinion is

pushed out of a recess, so as to gear with the aforesaid spur-wheel and the flying pinion. This gives a reverse action at a slow speed, and if pushed on into gear with the internally geared wheel, a forward action at a quick speed is obtained. It should be stated that the internally geared wheel is larger than the spur wheel, the latter causes the fork barrel to make 3·5 revolutions to one of the travelling wheel, the former 5·5. Thus we have first of all a slow forward and a more rapid backward action, but the introduction of the carrier pinion reverses this. The rapid backward motion is converted into an equally quick forward motion, and the slower forward motion in like manner into a slower backward motion. In this ingenious arrangement four speeds are secured with comparatively simple mechanical construction, and the necessary changes of pinion are rapidly effected. The working parts are protected by a cover—the gearings on the wheels being carefully covered—and the weight of the shaft is so nicely adjusted that only 26 lbs. is carried by the horse. With a view to further prevent clogging, a flange is welded on the axle, and in the larger machine this is doubled, at a short interval; we doubt the utility of either, and certainly the second flange is prejudicial and will no doubt be removed, since it was evident that, so far from preventing, it rather tends to increase the liability to clog. We may here notice the manifest advantage of variety of speed, to suit the paces of different animals.

Messrs. Ashby and Jeffery, Stamford, have long been known as manufacturers. Their haymaker at Manchester was a wide one, apparently of light draft, the position of the forks being regulated by a rack-segment in front. The wheels made of iron are open. Neither the spindle nor the wheels were properly protected, consequently there was immediate clogging, and further trial was discontinued.

Messrs. Ransomes, Sims, and Head brought before our notice quite a novelty in their *Star Haymaker*, invented by W. Andrews, of Melksham and greatly improved by the exhibitors. The distinctive feature of the Star Haymaker is the absence of forward motion. Two speeds are given to the back action by a simple change of gearing. The machine is strong and thoroughly well made. The axle is central; and the gearing, boxed up in the centre of the spindle, is out of the way of the falling hay. The hobs of the wheels are covered by caps, so that clogging is impossible even if in the fast back action the hay is elevated.

The tines are straight and very strong; they are each adjustable as to pitch to suit the crop and the rate at which the machine travels. The teeth arms are lengthened or shortened in a novel and ingenious manner. A disk plate with eccentric slots is attached to the axle. In the arms small pins are fixed which work in the slots. By loosening three clip-bolts the disk is released, and can be turned on the axle to the required position, when rigidity is again secured by tightening the bolts. In turning, the teeth continue to revolve by their own momentum, in consequence of a rachet and pawl arrangement in the travelling wheels. The machine is catalogued at 13*l*. 13*s*., which, considering the strength and excellent workmanship is a reasonable price. The absence of tedding action appears to us a defect, which might be easily altered by means of an annular gearing wheel. In order to test the capabilities of back action alone, as an efficient haymaker, we sent the machine along the swathes in the same direction as the mower had travelled, and so little had the grass been disturbed that we could distinctly see the form of the swathes, the intervals in many places not being covered. The crop was not by any means a heavy one, therefore it is clear that, dealing with mere grass, back action alone is not sufficient. We think if the makers will add, as they readily can do, a forward motion, the *Star Haymaker* will become a very efficient machine.

Messrs. Howard brought forward three machines. The first, entirely new, has already been alluded to. The advantages claimed for the central axle are:—The being able to work more perfectly across ridge and furrow without liability to breakage: the substitution of revolving for dead surfaces in the large

gearing boxes, whereby lodging and choking are avoided. By the removal of the side frame to the outside of the wheels, strength is increased, the loading of grass on the side frame is reduced, and the blocking in long grass is avoided. The central axle ties the whole machine together, and the tendency of the travelling wheels to get out at foot, and thus disarrange the gearing is obviated. The alteration of the machine from forward to backward action is effected by an eccentric movement, which necessarily leaves the forks nearer to the ground. This is so arranged as to suit the generality of cases; further alteration of position is possible, but is not so readily carried out as is desirable. The speed in both directions is uniform. This is a thoroughly strong machine, which worked well, but not better than Mr. Nicholson's, and having only one speed, is decidedly less adaptable to a variety of conditions; hence, whilst we consider it very meritorious, we felt justified in placing the Newark Haymaker before it, although, as will be gathered from the close approximation in the prize money, we considered the difference only trifling. The other machines were precisely similar to that which was placed first at Plymouth, differing from each other only in size and price.

J. G. Rollins, of Old Swan Wharf, London, exhibited an American invention of the crudest form, altogether the most gimcrack affair we have seen. It would have been dear at 5*l.*, yet was modestly catalogued 12*l.* 12*s.* The teeth, which are of strong wire wound round four wooden bars, were soon twisted in all directions. The gearing being unprotected would clog continually.

The last machine tried was that of Mr. J. Le Butts, Bury St. Edmunds; price 13*l.* The back and forward motions are at a uniform speed. The teeth are straight, but not adjustible as to pitch. There was a tendency to throw the hay up too much in the back action. Though not sufficiently successful in work for a second trial, we considered this is a useful haymaker.

The second trial of selected machines took place in a field on Mr. Bannister's farm, mown the previous day. Our awards were as follows:—

1st Prize of 16*l.*, W. H. Nicholson, Newark, catalogued No. 5636.

2nd Prize of 14*l.*, J. and F. Howard, Bedford, catalogued No. 3711.

Horse-Rakes.

The Council having offered a separate prize for Hay-Collectors as distinguished from Horse-Rakes, it was ruled by the Stewards, that in deciding upon the merits of the horse-rakes, the ability to collect hay into rows, one of their most important functions, could not be considered. Hence our experiments were confined to raking the stubbles and clearing the ground after the hay-carts. We may be allowed to question the propriety of giving separate prizes for the two operations. It should be a merit if the same machine can efficiently act as a horse-rake and a hay-collector. As it turned out, the implements entered under the latter title made such wretched work that we were compelled to withhold the prize.

Twenty horse-rakes were entered for competition. A preliminary trial, conducted over a piece of uneven ground, by demonstrating the comparative freedom of the tynes to act independently of the frame, and allowing us at the same time to observe the adaptation of the leverage, enabled us to select seven for further trial. Again, on a rye stubble, we drew out two machines as superior to the others, viz., Messrs. Ransomes' and Messrs. Howard's; and the final test was in raking up hay after the carts. Several of the machines were provided with a seat for the driver, and in three or four a self-acting leverage was brought to bear upon the teeth. The seat is a desirable addition, provided the emptying can be easily performed; but the self-acting levers in all cases acted too slowly, causing the teeth to be off the ground too long, and thus a portion of ground was left unraked. In several of the rakes the pitch of the

teeth was not right, and there being no arrangement for altering this, the points, instead of sliding along the ground, penetrated the surface, and regularly harrowed the stubble.

Messrs. Ransomes' Rake, which gained the first prize, is a very strong and effective implement. The teeth, 24 to 28 in number, according to the size of the rake, are of steel, and so formed as to carry a large quantity of stuff without rolling. They are of novel form, being a **T** section, which gives strength; and by reducing the actual distances between the teeth, insures clean raking, and reduces friction in delivery. The teeth are carried on a rocking frame, which can be made rigid if required, by a simple locking gear. Each tooth has considerable freedom of action. The teeth are removed by loosening a nut, each being hooked on to the tooth-bar. The height is adjustable by a crank leverage, both simple and good. A simple sliding block or clip is fixed on the lever to secure it to the segment. The necessity of removing the nut when an alteration is required being thus done away with, considerable time is saved. The frame is mounted on high wrought-iron wheels, capped to exclude dirt, and with long axles to insure steadiness. This rake worked well throughout, but its merits were particularly noticeable when raking hay, the great carrying capacity of the teeth being very apparent. The leverage for raising the teeth is also exceedingly well arranged for the driver, either walking or riding.

Messrs. Howard's Rake has some noticeably good points. The axle is above instead of being under the teeth; the latter are hung in couples, by which some additional weight is gained. In cases of breakage, the separate teeth are readily replaced. The wheels are high, and are made of cast-iron, with wrought bands. The teeth are tapered, being stoutest in the bend. This is a strong valuable machine, which made very good work; but it has a tendency to roll the hay, from a want of capacity in the belly of the teeth.

Messrs. Hornsby brought out quite a novelty—a rake with a double set of teeth, and a double length of surface to support them. The teeth are of a **T** section, and combine strength and lightness. They are so jointed on two centres, that when raised, one set throws the straw forward and the other back, and thus it should be left light. As shown at Manchester, this rake was not seen to advantage. The frame interfered with the freedom of action, therefore it either missed the stubble or threw up the dirt. Hence, like many more, it was at once passed over.

The following make up the seven sent for second trial:—

James Coultas, of Grantham, exhibited a light rake, in which each tine is suspended from the cradle by a short chain, the object being to allow the teeth more free and independent action.

Thomas Allcock, of Radcliffe-on-Trent, showed a good rake with light wrought-iron wheels, the frames carrying the tines being supported on a spindle in such a manner as to secure great freedom of action.

Edward Page and Co.'s rake is made with 28 sickle-shaped oval teeth, fixed by nuts and screws. The pitch of the teeth cannot be altered, except by raising or lowering the shafts; and the means of altering the height of the frame by nuts and screws on each side is rather clumsy and antiquated.

The rake exhibited by Holmes and Sons, of Norwich, has a very simple arrangement, by which it can be made to rake heavily or lightly as required. By simply shifting the handle of the lever, the whole, or only a part, of the weight of the teeth is brought to bear on the ground. The chisel points we thought objectionable, as tending to harrow the ground.

Our awards were,—

1st Prize, 20*l*., Ransomes, Sims, and Head, No. 766.
2nd Prize, 10*l*., Messrs. J. and F. Howard, No. 3714.

Hay-Collectors.

A few words will suffice to describe this portion of the programme. Only three makers exhibited, the five implements being all more or less similar, viz., on the principle of the American turn-over horse-rake. Far be it from us to condemn these cheap machines. When put into form and properly worked, they will collect a quantity of stuff, and leave the same lighter than an ordinary hay-rake. It is quite evident that they cannot at the same time rake the ground, consequently the horse-rake would be required afterwards. Unfortunately, the makers and their men were ignorant how to work the rakes, and having double the right number of teeth for such a heavy crop, they blocked up continually. We may mention the names of those present.

Riches and Watts, Norwich, two machines.
Hunt and Pickering, Leicester, one machine.
Bristol Waggon Company, two machines.

James W. Kimber.
John Hemsley.
Matthew Savidge.
John Coleman.

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4. *Report of the Judges on Systems and Machines for drying Hay and Corn in wet weather.*

This subject has engaged considerable attention lately, and its importance cannot be questioned, especially in those localities where the uncertainty or lateness of the climate renders the harvesting of both hay and corn precarious, and in cases where sewage is applied to the growth of grass, artificial drying is a great desideratum. In more favoured districts, a really wet harvest may be looked for as an exception once in every six or seven years; to provide against such an occasional contingency an economical apparatus is necessary. The Council, in offering a Gold Medal for the best system of drying hay and corn in wet weather, accompany the offer with this, as we think, proper restriction, viz., that the system must be sufficiently economical for practical purposes. It would be a serious mistake, injurious to the progress of improvement, if a crude invention, although possessing much ingenuity, and possibly containing the germ of future success, were to be stamped by the Society's most honourable notice, and go forth certified as a system which farmers could profitably employ. After giving a careful consideration to the two systems which were exhibited, we were unwillingly driven to the conclusion that we could not make an award.

Mr. W. A. Gibbs, of Gilwell Park, Essex, exhibited his apparatus, which has been so frequently described in the agricultural papers, and more particularly in an essay for which Mr. Gibbs was awarded the prize by the Society of Arts.* The idea is simple. The products of combustion are driven through a chamber containing the corn, or are brought directly in contact with damp hay, which is constantly being moved. The fan which exhausts may be worked either by horse-power or steam; if the latter, then the waste heat is utilized by bringing the smoke-box end of the engine in direct communication with the fan, which acts equally upon a dog-kennel furnace below, that being the chief source of heat. The products of combustion are driven by means of the fan into the drying chamber, which is in two compartments, acted upon alternately by means of a valve. Thus, whilst the corn is being dried in one part, it is being removed and renewed in the other. The fan is

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* The prize given by the Society of Arts was not awarded for the machine described, but for the principles upon which it was founded.

composed of four blades, 4 ft. 2 in. from outside to outside. The blades are 2 ft. 4 in. by 1 ft. 3 in., and revolve about 528 times per minute. Mr. Gibbs states that, by increasing the velocity of the fan, sufficient heat can be generated to act upon a much larger surface at one time than was possible in the apparatus under experiment. In drying corn the chambers are fitted up with iron plates, forming a false bottom, under which the heat is driven; it ascends by means of perforated cones, thirty-two in number, on each of which a sheaf is placed. Finally, the products of combustion and the moisture drawn out of the corn find vent along the corrugations of the roof by the eaves of the shed. The plan of working is first to fill one chamber with sheaves, close the door, and turn on the blast; whilst the process is going on the other chamber is filled, and thus there need be no cessation in the work. In dealing with hay it will probably be best to remove the shed altogether, leaving a cover over the mouth of the blast, and keep the hay constantly agitated. This appears necessary, as otherwise the occasional sparks might cause ignition as the hay became dried. Two men with mechanical assistance are required to be in attendance. The intense heat and vapours of sulphur, and other objectionable products, make this very distressing work, about which there would, we think, be a difficulty.

At the commencement of our experiment the temperature at the fan was 320°, in eight minutes it had risen to 358°. We could only deal with sheaves of green rye which had been cut by the reaping-machines. These we thoroughly wetted over night. The 32 sheaves before the experiment weighed 379 lbs., after fifteen minutes in the chamber 321 lbs. 12 oz., showing a loss by drying of 57¼ lbs. It is therefore abundantly evident that the moisture can be removed; the sheaves operated on were in a very wet condition, all soaked to the bond, and in a state which would be rare in nature. The question then is, how far the apparatus is in its present form practically useful. A man can pitch from 6 to 8 acres a day of corn, averaging 500 sheaves per acre; by a day we mean 10 hours' actual work, and it is clear that we ought to be able to dry the corn as fast as it can be brought from the field. What are the facts as proved by our experiment?—32 sheaves required 15 minutes to dry, or 1280 sheaves for 10 hours, a trifle over the produce of 2½ acres. Mr. Gibbs suggests night-work, and in some cases it might answer; but there would be considerable risk and inconvenience, and this expedient does not remove the inequality between the carting and drying the corn. Mr. Gibbs tells us, in his essay, that the apparatus could be greatly enlarged, but as we had no proof of this, and as any increase in space would necessarily require a greater amount of power to exhaust the products of combustion, and consequently cause an increase of expense, it is only reasonable to assume that Mr. Gibbs has adopted the space which his experience has proved to be most successful. So much for the process of corn-drying. We have said that the temperature rose to 358°; what influence, we may ask, would such heat have upon the germinating powers of the seed? It was evident that the butts of several of the sheaves nearest the fan were actually singed, and we cannot doubt that any ears coming in contact with the iron floor or false bottom would be kiln-burnt, and injured even for grinding purposes. If corn stands up well and is carefully tied the ears are at one end, but it often happens, especially in a laid crop, that some are reversed, and these would suffer. Any tendency of this kind might probably be modified by introducing a second floor and elongating the cones, but of course this would add to the cost.

With regard to the drying of hay, as to which the inventor attaches great weight, we are not prepared to speak very favourably. In the first place, the bulky nature of the article causes considerable labour; motion is absolutely necessary both to insure equal drying and to prevent ignition from the sparks driven through it. The heat and suffocating vapours from the coal are most

trying; high wages as well as much stimulant would be required; and, lastly, the hay itself must, we think, become more or less impregnated with the vapours, and thus be rendered unpalatable for food. On this latter point, however, we have no experience or conclusive evidence, and therefore our opinion will be taken for what it is worth. If heated air could be substituted for the foul products of combustion, without a too serious loss of power, we should entertain a more favourable opinion of the apparatus. The cost of the fan, chamber-stove, and self-acting fork amounts to 85*l*., according to the catalogued prices. To this must be added the expense of steam or horse-power. Calculating roughly, we believe the expense, including labour, of drying corn by Mr. Gibbs's apparatus in its present form, will vary from 12*s*. 6*d*. to 15*s*. an acre, figures which are by no means prohibitive.

There are, we are convinced, the germs of future success in Mr. Gibbs's praiseworthy efforts, and it is with sincere regret that we felt ourselves precluded from bestowing on him the Society's Gold Medal.

Daniel Adamson and Co., of Hyde, near Manchester, the other exhibitors, showed a plan for driving a current of air through sheaves of corn. This consists of a vertical fan, driven at a high velocity, which sucks in the air both above and below, and forces it out through the corn which is stacked all round on a wire frame. In the apparatus as exhibited there was only room for 12 sheaves. These, after an exposure of 15 minutes, were relieved of about ½ lb. of water on the average, this principally on the side most exposed to the current of air, and the moisture about the band was not removed. The atmosphere at the time of our trial was in a very dry condition, and therefore highly favourable. In the event of the atmosphere being loaded with moisture it is proposed to draw the air through a heated surface, and thus dry and warm it. Further alterations may develope this idea into some practical form, but at present it is in far too crude a state to require further notice.

Davy, Paxman, and Davy, of Colchester, exhibited an arrangement for drying grain after it is separated from the straw, by means of steam-heated cylinders; though clearly not eligible for competition with the above, its connection with the subject entitled it to consideration. It will be remembered by those who visited the meeting at Bury St. Edmunds, that the same firm showed a steam-jacketed cylinder attached to a threshing machine, through which the corn was propelled, and during its passage was subjected to a double action, namely, that of the steam in the jacket, and that of a blast of hot dry air generated in a small furnace on the opposite side of the machine and exhausted by a fan. The tube was too short to allow of success, there was danger and inconvenience in the furnace, only a portion of the moisture was removed, and the corn came out clammy and wet. The present arrangement, though still imperfect in some details, is a great advance, and may be regarded as a practical invention. The apparatus consists of four cylinders, 12 feet long. The centre cylinder, which revolves, is 12 inches diameter, and acts as a steam chamber, being supplied with steam from the boiler of the engine by a small galvanized india-rubber tube. This cylinder is furnished on its external periphery with four screw arms, by which the corn is not only propelled forwards, but, owing to perforations in the blades, made to fall frequently from the top to the bottom of the cylinder, and thus becomes exposed as much as possible to the drying agencies presently to be described. The steam is conducted by a tube from the end of the inner cylinder to the third cylinder or steam-jacket. The corn is thus between two steam chambers, fed in according to its condition by a regulated hopper. Outside of all is a cylinder communicating with the air by a number of holes (63) at the end where the steam enters. This cylinder is exhausted by a fan, and the air rushing in is heated in its progress, and then driven through the corn chamber, meeting the grain and drying it materially. Thus the corn during its progress through a 12-feet

tube is acted upon by two steam-heated surfaces, and by a blast of heated air meeting it. The inner cylinder is driven by cog-gearing 14 to 104. The spindle makes 34 revolutions per minute. The temperature at the mouth of the exhaust outlet was 170° at the commencement of our experiment, but soon fell to 140°, showing the heat that was absorbed in the process. The condensed steam is returned by a flexible tube to the water tank, heats the latter and economises fuel. In order to ascertain the amount of fuel consumed in the process, the condensed steam was collected, when it appeared that 1 lb. of coal was consumed in drying 2 bushels of corn. The wheat was soaked over night, 14 lbs. of water being added to 2 bushels of grain. The weight at starting was 1 cwt. 1 qr., which was reduced to 1 cwt. 20 lbs., thus showing that 8 lbs. of water had been extracted. The corn was passed through at the rate of 30 bushels an hour. When the same corn was subjected to a second trial, it was made much drier than originally, the weight being reduced to 1 cwt. 4½ lbs. as compared with 1 cwt. 14 lbs. Thus it is clear that damp corn may be successfully dealt with. The wheat in our experiment was in a condition of excessive dampness such as would seldom occur in practice. It is probable that in all ordinary cases sufficient moisture would be removed by one operation. The price of the machine is only 26*l.*; it can be attached to any portable engine, and being on wheels is easily moved about. We consider this a practical invention, which will be valuable after catching harvests. It not unfrequently happens that the top of the stack suffers from weather before it is thatched. In such cases the corn threshes very damp and unsuitable for market. If put through the drier and afterwards blown over, a great improvement could be made. The pressure of steam in the cylinder should not exceed 5 lbs. to the square inch. We considered this invention deserving of a Silver Medal, and having received the sanction of the Stewards, had much pleasure in awarding it.

J. Bailey Denton,
John Coleman.

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5. *Report of the Judges on Waggons, Carts, Harvest Carts, Market Carts on Springs, Liquid and Dry Manure Distributors.*

The Prizes offered by the Royal Agricultural Society in this Department were as follows, viz.:—

		£.
Section 6.—	Pair-horse Waggons	30
„	Other Waggons	20
Section 7.—	Single Horse Carts	20
„	Two-horse Carts	20
„	Harvest Carts	15
„	Market Carts on Springs	10
„	Liquid Manure Carts	10
Section 8.—	Carriages with low body—adapted for moving Stock, Implements, &c.	20
Special Prize offered by the Manchester Local Committee.		
Broadcast Distributor of Guano or other Manure		10

On examining the Catalogue, which contained the names of many manufacturers who had previously been successful exhibitors, we found that the competition in carts and waggons exceeded that of former years. After numbering the articles, we at once went through the several stands to examine them minutely, and place upon each selected article a ticket for trial.

We had not proceeded far, ere we found the difficulty in which we were likely to be placed, to arrive at a satisfactory conclusion as to our Awards, so

nearly, from mere eyesight, did many appear to be in merit: generally the workmanship was excellent, as also were the strength, quality, and durability of materials employed.

Very great credit is due to the exhibitors; and it was evident by their progress that the time was fast approaching when the Judges' difficulties would be further increased. In considering the class of waggons, we decided that each waggon in its class should be loaded with "Pig Iron," and have the draught tested by use of the Dynamometer, that being the only aid which we could obtain, and which would give us the assistance we needed. Having all the best and successful makers in the kingdom, who have for years exhibited in competition at the Royal Agricultural Society's Shows, the plan we had adopted would not only give us reliable assistance, but would also be most interesting and useful to the public, as well as give valuable information to the exhibitors themselves.

The details of mechanical construction: the diameter of wheels, distance between the wheels, weight of waggon, and especially the distribution of the weight of the vehicle on the front and hind wheels, are particulars most useful in ascertaining the special points on which differences in draught depend.

Pair-horse Waggons.—Eight waggons in this class were selected and placed together for trial, viz., Frank Milford (23), Chapman (28), Hayes and Son (733), Ball and Son (1002), Crosskill and Sons (1403), Beverley Iron Company (1714), Thomas Milford and Sons (356), and Corbett (3837).

Two tons of iron were put into each waggon, so placed as to be equally divided on the centre of the front and hind wheels, and the dynamometer was then applied.

The prize of 30*l.* was divided betwixt Crosskill (1403), Hayes (733), and Thomas Milford (356).

The first prize waggon (1403) is strong and very well made, frame of English oak, outside soles 4 inches square, sides of red pine, strengthened by oak stowers outside; harvest rails attached, iron axles through, and the body well ironed; wheels strong, with 2½ inch by ¾ inch tyre; price 32*l.*

Hayes (733), to which we gave the second prize, is a well-built waggon also, sides of elm planking, oak foundation, harvest rails well secured, a double break with quick and easy action; price 30*l.* 10*s.*

Thomas Milford (356) was awarded the third prize: a well-made waggon, plank sided, of 1¾ elm, double break, and harvest ladders; price complete 35*l.*

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ *s.* *d.*
1403	W. Crosskill and Sons ..	Pair-horse Waggon	15 0 0
733	Henry Hayes and Son ..	Ditto	10 0 0
356	Thomas Milford and Sons ..	Ditto	7 10 0
1714	Beverley Waggon Company	Ditto	Highly commended.
1002	Ball and Son	Ditto	Commended.
28	Chapman	Ditto	Commended.

Other Waggons.—Five waggons were selected from this class for trial, viz., Hayes (732), Ball and Son (1001), Beverley Waggon Company (1716), Corbett

(3838), and George Ball (4089), and a more splendid collection of really substantial and well-built waggons was never placed together, the workmanship of some being most excellent. Four tons of iron were placed on each waggon, equally divided on the centre of the front and hind wheels, and the dynamometer then applied.

Hayes (732) won the first prize of this class; better workmanship than it exhibited could not possibly be seen. This waggon was very strongly built, of solid elm plank sides 1¾ inch thick, frame entirely of English oak, very strong, fitted with double shafts, fixed sideboards, well ironed, and with loose side and end boards for carrying manure; head and tail ladders were well secured with body-boards of elm, 1 inch thick, fitted with double break of 2½ by $\frac{5}{8}$ iron (passing under the body, and giving additional strength to the waggon); it is quick, powerful, and easy in action. The wheels are very strong and well made, with 3 by 7 tyre, axle 3 inches square (short), and secured by a strong plate of ½ inch iron underneath; price 35*l*.

To the Beverley Waggon Co. (1716) we awarded the second prize. This waggon is well built, strong, and fitted with a pole (Yorkshire fashion). The framework is all of the best English oak, with red pine sides of 1½ inch thick, supported and strengthened on the outside by strong oak stowers; the ironwork throughout is of sufficient strength, iron axles through and fitted with patent wheels, of 3 inches by ¾ tyre, drag-chain, and shoe. There are no head or tail ladders attached, nor any loose side-boards for carrying bones, which for most counties would be considered a deficiency; price 37*l*., double shafts extra, 1*l*. 10*s*.

Under this class were exhibited drays or lurries, we therefore agreed to award no third prize, but to give the remaining sum of 5*l*. as a prize to the best lurry.

Four were selected and tickets attached for trial. Four tons of iron were placed upon each, as upon the "other waggons," and the dynamometer then applied; the result will be seen in the schedule annexed, as also the weight of each. All the lurries were fitted with strong springs, and it is shown in the schedule that though the weight of the lurries but slightly exceeded that of some of the waggons, the draught was beyond—in some instances much beyond—of the waggons carrying the same weight.

The Beverley Waggon Co. (1804) and (1800), Hayes (737), and Humphrey Bracewell (4058), were the exhibitors. To the Beverley Co. (1804) we gave the prize. It was a very strong well-built lurry, length 13 feet, by 6 feet wide, frame of English oak, wheels with patent axles, and six inches convex tyre, and took the least draught; price 44*l*. 10*s*.

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ s. d.
732	Hayes and Son	Other Waggons.	10 0 0
1716	Beverley Waggon Company	Ditto	5 0 0
4089	George Ball	Ditto	Highly commended.
3838	Thomas Corbett	Ditto	Commended.
1804	Beverley Waggon Company	"Lurry"	£5 0 0
4058	Humphrey Bracewell	.. ..	Highly commended.
737	Henry Hayes and Son ..	.. ..	Commended.

Single Horse Carts.—Under this class we selected ten to be taken out and placed together for our inspection, viz., Frank Milford (24), Chapman (31), Woods and Cocksedge (137), Harrison (172), Milford and Son (359), Hayes (739), Ball and Son (1004), Crosskill (1405), Beverley Waggon Co. (1718), and Corbett (3839). This class was equally as creditable to the exhibitors as the former class of waggons, for construction, strength, durability, and especially excellent workmanship. The greatest difference in principle was in the mode of tilting, which evidently applied to the custom in the various counties they represented. These arrangements of tilting commanded our special attention, and we considered "Hayes," the most simple, useful, and effective. To Hayes's cart (739) we awarded the first prize: very strongly and well built, of the same excellent workmanship he exhibited in his waggons; sides of solid elm planking 1¾ inch thick, frame strong, and of English oak, fixed side-boards, strongly ironed; with head and tail ladders complete; tipping apparatus excellent, the part at all likely to get out of order could be renewed at a mere nominal expense; through axle of 2¾ inches square, wheels well made with 4 inches by ¾ inch tyre, the body carried on each side upon an iron flange of 6½ inches long, by 3 inches wide and ⅞ thick, part-and-parcel of the axle; body-boards of elm an inch thick, placed lengthways; price 14*l*. 10*s*.

Corbett was awarded the second prize with his cart (3839), a very roomy, strong, and useful cart. Frame of English oak, plank sided, fitted with harvest ladders; iron axle through, well made wheels of 4 feet 7 inches diameter with 4 by ⅝ inch tyre; the tipping apparatus less complicated than most; the workmanship we considered very good, and the price moderate, 14*l*.

Messrs. Crosskill (1405), we awarded the third prize. The class altogether was well represented.

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ s. d.
739	Hayes and Son	Single-horse Cart	8 0 0
3839	Thomas Corbett	Ditto	7 0 0
1405	Crosskill and Son	Ditto	5 0 0
31	William Chapman	Ditto	Highly commended.
1718	Beverley Waggon Company	Ditto	Ditto
359	Milford and Son	Ditto	Commended.
1004	William Ball and Son.. ..	Ditto	Ditto

Two Horse Carts.—Nine under this class were selected for inspection, viz., Frank Milford (26), Chapman (30), Woods and Cocksedge (141), Harrison (171), Thomas Milford (358), Hayes (741), Beverley Waggon Co. (1724), Ball and Son (1005), and Corbett (3840), all of whom were exhibitors in the Class of Single Horse Carts. Hayes (741) was placed first in this class, a cart precisely on the same principle as his single horse cart, but it was also stronger; larger in the body; the wheels were broader and stronger, and capable of carrying a much greater weight, the head and tail ladders were complete, and the tipping apparatus the same that received our special approval; price 16*l*.

To Ball and Son (1005) we awarded the second prize. This also was a strong well-built cart, of English oak frame, and pitch-pine sides of 1½ inch thick, harvest ladders complete, fixed side-boards bound with ½ inch round plate iron,

tipping apparatus; axle 2½ inches square through, with 4½ by ¾ inch convex tyre. This tyre is of milled steel, costs 14*l.* per ton, and is supposed to wear better than the ordinary iron tyre. Considering the amount of iron which is used upon this cart, with the steel tyre also, the price is low: 15*l.* 10*s.*

The Beverley Waggon Co. (1724) was awarded the third prize. A very strong and durable cart, with harvest frame added; patent wheels, price 18*l.*

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ *s.* *d.*
741	Hayes and Sons	Two-horse Cart	8 0 0
1005	Ball and Sons	Ditto	7 0 0
1724	Beverley Waggon Co. ..	Ditto	5 0 0
26	F. Milford	Ditto	Highly commended.
3840	Thomas Corbett	Ditto	Ditto
141	Woods and Cocksedge ..	Ditto	Commended.
171	Harrison	Ditto	Ditto

Harvest Carts.—Our selection in this class numbered five, viz., F. Milford (27), Hayes (744), Bristol Waggon Co. (1067), Crosskill (1412), and the Beverley Waggon Co. (1727). We very easily decided to whom the first prize was to be awarded, there being only one cart exhibited which was provided with sides secured against the loss of shaken corn. To Hayes (744) we awarded the first prize; this is a substantial yet light cart, the body low and entirely of ash, upon a frame 4 inches square; sides strengthened by iron spindles of ½ inch round rod, placed at equal distances of 6 inches, lined with willow boards of ⅝ in. thick, iron axle through, of 4 by ⅜ in.; wheels 4 feet 10 in., tyre 4 by ⅜ in.; length of body 9 feet 10 in., and width 4 feet 4 in.; head and tail rails projecting 2 feet. The wheels are protected from interfering with the corn by an iron frame of ½ inch thick, covered with strong sheet iron, of ⅛ inch by 10¼ inch broad, which is bolted to the two cross pieces of the body, giving additional strength to the cart; price 15*l.*

Frank Milford (27) we gave the second prize. A useful cart, but quite open at the sides, and wanting the protection against loss of corn; price 12*l.*

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ *s.* *d.*
744	Messrs. Hayes and Son ..	Harvest Cart	10 0 0
27	Frank Milford	Ditto	5 0 0
1727	Beverley Waggon Company	Ditto	Commended.

Market-Carts on Springs.—Six carts were selected for inspection, viz., Crosskill (1411), Beverley Waggon Co. (1728, 1729, and 1730), Corbett (3841), and Pickering (4038). After a minute examination, the first prize was awarded to the Beverley Waggon Co. for (1730), a most useful, strong, and cheap

market-cart on springs, very suitable indeed to the purpose for which the Society offers the prize; price 18*l.* 10*s.* Corbett (3841) was awarded the second prize; price 14*l.* 10*s.*

Mr. Pickering exhibited (4038) a very highly finished cart, but we considered it of too expensive and polished a character, and beyond the purpose for which the Society offered the prize.

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ s. d.
1730	Beverley Company	Market Cart on Springs	6 0 0
3841	Thomas Corbett	Ditto	4 0 0

Liquid Manure Carts.—Nine of this class were placed together, viz., Baker (351), Woods and Cocksedge (146), James (392), Reeves (528), Coleman (569), Crosskill (1415), Beverley Waggon Co. (1736), Hunt and Pickering (1908), and Watts (4286). We decided that the several carts should be tested, by mixing a small quantity of screened soil in the water, and so have them put into action; but we found the soil, being insoluble, choked up the holes, and we were obliged to abandon the system, and have all tested alike with water, each cart having put into it 180 gallons. James (392) we awarded the first prize, for its evenness of distribution had decidedly the advantage. This cart will contain 270 gallons; it is made of wood, 1½-inch red deal, jointed together by his patent joint, "*James's patent*," which is considered to keep it perfectly watertight; it is 4 feet 8 inches wide, by 6 feet long; depth 2 feet 2 inches, and supplied by a pump of galvanised iron, ⅛ of an inch thick, and 4½ inches bore; the quantity of liquid manure applied is governed by lever and valve; the trough will distribute water or liquid manure to a width of 15 feet, and a flange is in the centre of the trough, giving ready access in case of any stoppage which may arise; price 17*l.* 17*s.* The second prize was awarded to Baker (351), a cart made of iron, cylindrical shape, having the axle passing under the centre, pump attached, and also a stirrer revolving inside; it contains 180 gallons, and distributes a width of 6 feet; price 24*l.* 10*s.*

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ s. d.
392	Isaac James	Liquid Manure Cart	6 0 0
351	Thomas Baker	Ditto	4 0 0
528	R. & J. Reeves	Ditto	Highly Commended.
569	Coleman and Morton	Ditto	Ditto

Carriage with Low Body, adapted for removing Stock and Implements.—Four only were presented for our inspection, Woods and Cocksedge (144), Beverley Co. (1739 and 1740), and Corbett (3842). So infinitely superior was one from the rest, that we decided to give to the second prize only a small portion of the money, as will be found in the prize list: Corbett (3842) is a very perfect and substantial cart, well suited for the purpose, very strongly built, frame-work of oak, as also the bottom of 1-inch oak boards lathed across, covered with water-

proof canvas, cranked axle 2½ inches square, upon strong springs, wheels 4 feet 9 inches diameter, with 4½ inches by ¾ inch convex tyre; a spring lever is attached, which enables the cart to be kept perfectly level, however undulating may be the ground, as well as rendering great assistance by lowering the body of the cart when the animals or implements are needed to be put in or taken out. It is also arranged to let down the front door and the animal to walk out, instead of the usual system of backing out. The opening of the door behind is also well considered, that no aperture is left when open, obviating the danger of stock, especially sheep, being lamed when going in. In fact, we considered, there was nothing wanting in this cart that could be desired; price 23*l.* The Beverley Co. (1740) had the second prize awarded to it; price 24*l.* 10*s.*

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ *s.* *d.*
3842	Thomas Corbett	Carriage for removing Stock, Implements, &c.	15 0 0
1740	Beverley Waggon Company	Ditto	5 0 0
1739	Beverley Waggon Company	Ditto	Commended.

Dry Manure Distributors.—Four machines were selected for trial, Reeves (531), Coultas (596), Harrison (1169), and Holmes and Son (4309). These several drills were tried with a quantity of riddled road scrapings, made damp with water, and this was distributed at a rate varying from 6 to 12 bushels to the acre; the difficulty being in evenly distributing small quantities. After careful examination and trials, we decided to give Reeves's drill (531) the prize, which distributes a width of 6 feet 6 inches. The roller is in loose segments, working on a screw principle; the quantity is regulated by a slide on the outside, and the drill can be made to distribute evenly from 4 to 60 bushels to the acre; it has a stirrer inside, which can easily be worked by hand when needed. The roller is in two parts, driven separately from each end; the principle entirely prohibits any clogging; it is exceedingly simple in construction, and not at all liable to get out of order. The box is made of wood, with cast-iron ends, wheels 3 feet 8 inches in diameter, 1⅝ inch by ⅝ inch tyre, drawn by one horse; an index shows where to fix the slide, to regulate the exact quantity of tillage you wish to apply per acre. Price 10*l.* 10*s.*

The other distributors were on quite a different principle, and by us were considered complicated, and when not in use liable to get out of order.

Number of Article.	Name of Exhibitor.	Description.	Prize.
			£ *s.* *d.*
531	Messrs. R. & J. Reeves ..	Broadcast Manure Distributor.	10 0 0
596	James Coultas	Ditto	Highly Commended.

As will be seen we have not adhered to the principle of awarding the prizes to waggons of the lightest draught, yet the dynamometer greatly assisted us in our decisions. Workmanship and strength, with durability of material, were essential objects in our consideration, towards guiding us in our awards. As may be observed in the schedule annexed, one particular waggon took con-

siderably less draught than others tested; as the workmanship was inferior to the rest, we could not give it a prize, nor yet a commendation, though, doubtless, the principle of construction was very good; besides; which, we considered it of too light a structure for general farm uses, hence, probably, one cause of its lightness of draught.

The schedule annexed, containing all the dynamometrical trials and other useful details, was compiled under the superintendence of Mr. James Amos; and for the accuracy with which they were recorded, we beg to tender him our best thanks.

John Wheatley.
John Gibson.
Henry Cantrell.

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6. *Report of the Judges on Plans and Models.**

Though the exhibitors in this class were few, and the competition therefore small, the difficulties in awarding the prizes were considerable, arising from circumstances which it may be useful to explain.

Labourers' Cottages.—The conditions imposed were, that the cottages should be built in pairs, with not less than three sleeping-rooms each, and that in addition to "cheapness, arrangement, and convenience," it was declared that "space, economy, and durability would be specially considered."

The exhibitors whose plans and models arrived in time for competition were only six in number; and although seven designs were presented by one exhibitor, there were only fourteen exhibits in all. There was evidence of much skill in arrangement, and of efforts to reduce cost in several of these designs, but there was not one which presented any new feature. With so little scope, however, for variation as is afforded in labourers' cottages of the character specified in the conditions, this was not to be expected, inasmuch as the minimum accommodation must necessarily be much the same in all designs. As evidence of the difficulty of originating any new feature, it may be stated that several of the plans exhibited were based on that of Messrs. Ross and Richardson, who gained the prize given by the Yorkshire Agricultural Society, at Leeds, in 1861, a plan which has been adopted as the pattern of a large proportion of the cottages now being built in various parts of the country.

The Judges, on entering upon their duties, determined that no design afforded sufficient space unless the floor of the living-room contained an area of 150 square feet—that of the parents' bedroom 100 feet, and those of the children's rooms 70 feet each; while the height between the floor and the ceiling of the ground floor should not be less than 8 feet, and that of the bedrooms 7 feet 6 inches, thus affording a minimum breathing space in the living-room of 1200 cubic feet—in the parents' bedroom of 750 feet, and in the children's bedrooms 500 feet each. They considered that the "arrangement and convenience" essential for the comfort of a labourer's family should include a scullery containing at least 550 cubic feet, a pantry with shelves having a cubical area of at least 250 feet, and a cupboard for fuel within the dwelling, as well as a copper or galvanized iron boiler, either in the dwelling or in an adjoining out-building, together with proper privy or earth-closet, water supply including pump, and a perfect drainage of the whole premises.

Durability being an essential condition in all cottage building, and there being no true economy or satisfactory "cheapness" without it, the skill of the designer of labourers' cottages is best shown by so arranging the space and accommodation required, that the aggregate cubical area of the cottage shall be

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* **Special Prizes offered by the Manchester Local Committee.**

SECTION VI. Class 1.—Pair Horse Waggons.

No.	Exhibitor.	Circumference of Front Wheel. ft. in.	Circumference of Back Wheel ft. in.	Wheel Base. ft. in.	Cubic Capacity of Body. ft. in. × ft. in. × ft. in.	Dimensions of Tyres. in. Front. in. Back. in.	Mean Height. ft. in.	Height in Front. ft. in.	Gauge of Wheels. ft. in.	Load on Front Wheels cwts. qrs. lbs. + Load on Back Wheels cwts. qrs. lbs.	Total Weight of Waggon cwts. qrs. lbs.	Distance Run. yds.	Time Running secs.	Rate. miles per hour.	Mean Draft in lbs.	Remarks.
23	F. P. Milford	10 0	15 0	5 2	9 9 × 3 11½ × 1 2¾	2½ × ⅝ × ⅝	4 10½	5 0	4 7½	8 1 17 + 10 0 0	18 1 17	105	90	2·38	220·2	N.B.—In these experiments each waggon was loaded with 40 pigs of "Gartsherrie" iron, weighing 2 tons. The distribution of weight of vehicle on front and hind wheels was ascertained by the weigh-bridge. The thickness of tyres in all cases was measured at the edges.—H. C.
28	Chapman	10 2½	15 1	6 3	10 9 × 4 0½ × 1 5½	2⅝ × ¾ × ⅝	5 4	5 7	4 8½	8 1 0 + 9 3 0	18 0 0	107	83	2·63	197·9	
356	T. Milford and Son ..	10 5	14 9	6 1	11 0 × 3 10½ × 1 3½	4 × ⅝	5 0	5 5	4 8	9 2 20 + 10 1 6	19 3 26	108	82	2·69	174·8	
691	Torr	11 9	14 10	5 6½	10 3 × 4 3½ × 1 2	2½ × ⅝	5 5	5 10½	4 9½	10 1 7 + 8 2 9	18 3 16	111	83	2·73	136·2	
733	Hayes	10 5½	14 10½	5 9½	9 9¼ × 4 2¼ × 1 1¼	3 × ¾ × ⅝	5 1	5 9	4 7	9 0 25 + 9 0 6	18 1 3	110	78	2·88	198·6	
1002	Ball	10 5½	14 9½	6 1½	10 2½ × 4 1½ × 1 4½	2½ × ⅝	5 2	5 6	4 7	9 3 14 + 9 3 23	19 3 9	108	77	2·86	211·6	
1403	Crosskill	10 7	15 0	5 9½	10 5½ × 3 9½ × 1 3¾	2½ × ¾	5 1	5 6½	4 3½	9 3 0 + 10 0 26	19 3 26	110	80	2·81	231·2	
1714	Beverley Company ..	10 6	14 8½	5 9½	10 1 × 3 11½ × 1 3	3 × ⅝ × ⅞	4 11	5 6	4 5	10 3 2 + 9 3 22	20 2 24	108	87	2·53	231·1	
3837	Corbett	10 3½	15 3	6 3	10 8 × 3 11 × 1 5½	4 × ½	5 2	5 8	4 8	11 2 7 + 12 3 6	24 1 13	111	82	2·77	274·7	

SECTION VI. Class 2 (*a*).—Other Waggons.

No.	Exhibitor.	Circumference of Front Wheel. ft. in.	Circumference of Back Wheel ft. in.	Wheel Base. ft. in.	Cubic Capacity of Body. ft. in. × ft. in. × ft. in.	Dimensions of Tyres. in. in.	Mean Height. ft. in.	Height in Front. ft. in.	Gauge of Wheels. ft. in.	Load on Front Wheels cwts. qrs. lbs. + Load on Back Wheels cwts. qrs. lbs.	Total Weight of Waggon cwts. qrs. lbs.	Distance Run. yds.	Time Running secs.	Rate. miles per hour.	Mean Draft in lbs.	Remarks.
732	Hayes	10 9	15 9	6 7	10 10½ × 4 2½ × 1 5	3 × ⅞	5 9	6 2½	4 9½	12 0 0 + 12 0 1	24 0 1	112	85	2·69	628·7	N.B.—In these experiments each waggon was loaded with 80 pigs of "Gartsherrie" iron, weighing 4 tons. The distribution of weight of vehicle on front and hind wheels was ascertained by the weigh-bridge. The thickness of tyres in all cases was measured at the edges, and the extreme thickness of the bevel tyres was about 1/16 inches.
1001	Ball	10 8½	15 0	6 5	11 0 × 4 2 × 1 6½	2¾ × ¾	5 6	5 8	4 8	10 1 22 + 11 1 14	21 3 8	110	85	2·64	646·6	
1403	Crosskill {Also tried in the pair-horse class.}	10 7	15 0	5 9½	10 5½ × 3 9½ × 1 3¾	2½ × ¾	5 1	5 6½	4 3½	9 3 0 + 10 0 26	19 3 26	110	100	2·25	531·6	
1716	Beverley Company ..	10 5½	14 10	5 11½	10 4 × 3 10 × 1 4½	Back. Front. 3 × ¾ & ⅞	5 1	5 9½	4 4	10 2 0 + 10 3 14	21 1 14	110	87	2·58	641·0	
3838	Corbett	10 8	15 1	6 7	11 0 × 4 1½ × 1 6	Bevel Tyre. 4½ × ⅝	5 4½	5 11	4 7½	13 1 7 + 14 1 9	27 2 16	110	96	2·34	680·0	
4089	Ball	10 5	15 1	6 8½	11 0 × 4 2½ × 1 7½	Bevel Tyre. 4 × ½	5 5½	5 9½	4 7½	9 3 21 + 11 1 21	21 1 14	110	104	2·16	570·6	

SECTION VI. Class 2 (*b*).—Other Waggons (Lurrys).

No.	Exhibitor.	Circumference of Front Wheel ft. in.	Circumference of Hind Wheels. ft. in.	Mean Height. ft. in.	Dimensions of Platform. ft. in. × ft. in.	Dimensions of Tyres. in. in.	Gauge. ft. in.	Wheel Base. ft. in.	Load on Front Wheels. cwts. qrs. lbs. + Load on Hind Wheels. cwts. qrs. lbs.	Total Weight of Lurry cwts. qrs. lbs.	Distance Run. yds.	Time Running. secs.	Rate per Hour. miles.	Mean Draft in lbs.	Remarks.
737	Hayes	9 2½	9 8	3 6½	4 11 × 11 1	2¼ × ¾	4 7½	6 10½	8 0 0 + 7 2 16	15 2 16	111	90	2·52	703·2	N.B.—In these experiments each lurry was loaded with 80 pigs of "Gartsherrie" iron, weighing 4 tons. The distribution of weight of vehicle on front and hind wheels was ascertained by the weigh-bridge. The thickness of tyres in all cases was measured at the edge. In all the traction experiments the same distance was run as nearly as practicable, and the same road, which was hard and firm, used for all.
1800	Beverley Company ..	9 5	10 5	3 10½	5 2½ × 11 7½	3 × 11/16 × ⅝	4 7½	6 8½	8 3 21 + 8 3 24	17 3 17	110	85	2·64	740·22	
1804	Beverley Company ..	11 0	12 1	4 4½	5 8½ × 12 8	6 × ⅝ × ½	4 5	7 7½	12 1 22 + 12 1 6	24 3 0	110	87	2·58	654·7	
4058	Bracewell	10 4	11 1	3 11	5 6½ × 13 2	Bevel Tyre. 4½ × ½	4 9	8 1	12 1 6 + 13 1 13	25 2 20	111	98	2·31	715·56	

To face p. 564.

reduced to a minimum. No architect can govern the cost of materials, which differs with local circumstances; and the only influence he can really have is in the selection of the best and cheapest which different neighbourhoods afford. To make, therefore, a fair comparison of competitive designs of cottages, it is necessary to assume that all are built of the same materials, that each description of material is paid for, and at the same rate, and further, that the carriage of all the materials is either fairly valued or paid for. When this is done, it will be surprising how very limited is the power to reduce the cost of cottages. This statement will be better understood when the dimensions and particulars of the three designs for which prizes have been given are compared (see next page). The design, No. 2430, of Mr. Edwin Clarke, of No. 30, Monk's Road, Lincoln, is for a very compact pair of cottages with living-room, scullery, pantry, and fuel-store on the ground-floor, within a quadrangular base, the pantry and coal-store being a lean-to within the quadrangle. The three bedrooms are all above. The privy and ashpit are detached.

The plan No. 6844, of the Central Cottage Improvement Society, of Arundel Street, London, is that known as the Kirtlington Cottage, designed and erected by Captain Dashwood, in which one bedroom is placed on the ground floor, and two above—the scullery, pantry, and fuel-store forming a lean-to at the back, and running the whole breadth of the cottage. Considerable advantage attends the arrangement of one bedroom on the ground floor; it allows the parents when they get old to live with a married son or daughter. There is no copper in the scullery; this it is designed to put in the outbuildings with the privy and ashpit. The living room and scullery are slightly deficient in space; the bedrooms, however, are larger than necessary.

The design No. 6855, of Mr. James Martin, of Wainfleet, is very compact, with accommodation arranged in a somewhat similar way to that of Mr. Clarke. The rooms, however, are smaller, and there is only one door, and that at the back, which is objected to by some persons, though it has the recommendation of saving a little money, and of making the dwelling warmer. The objection to the arrangement rests on the ground that it is opposed to cleanliness and comfort, and though it prevents a draught, it discourages ventilation.

It will be observed that, between the first (No. 2430) and second (No. 6844), there is a difference of 613 cubic feet only (see Table, next page); and as the extent of accommodation is very similar, and there certainly is no feature making the second cheaper in construction, any difference in cost will be due to this difference in cubical contents. It will be seen, however, that the estimate in the second case (the "Kirtlington Cottage") is only 175*l.* the pair, including the carriage of materials, which, as nothing is said to the contrary, we are led to infer is covered by the estimate; while that in the first is 230*l.* the pair, excluding the carriage of materials, showing a difference of 80*l.* if the carriage of materials is put at the ordinary cost of 25*l.* per pair, although the difference of space (613 cubic feet), if taken at 3¼*d.* per cubic foot, would amount to only 8*l.* 2*s.* 6*d.* The competitors' estimates, therefore, cannot be taken as any guide to the public. In the third case, the estimate of cost approaches nearer the amount which general experience will confirm. The cubical content of this design is less than either of the others, though the estimate is 220*l.*, exclusive of the carriage of materials, which, at 25*l.* per pair of cottages, will raise the cost to 245*l.* General experience has decided that, if all materials with the carriage are paid for at the average prevailing cost, and labour is performed at a price yielding a fair profit to a contracting builder, with interest upon the money he employs, the price cannot be taken at less than 3¼*d.* per cubic foot, including outbuildings, having regard to such cottages as are described in the present conditions. The actual price will vary from 3¼*d.* to 4*d.* per foot. In some instances, where certain materials used are produced or

Number in Catalogue.	Name of Exhibitor.	Contents of each Cottage. Of Ground Floor. Dimensions of Floor Space.	Contents of each Cottage. Of Ground Floor. Contents of Superficial Space.	Contents of each Cottage. Of Chamber Floor. Dimensions of Floor Space.	Contents of each Cottage. Of Chamber Floor. Contents of Superficial Space.	Total Mean Height. Of each Cottage, including Floors and Roofs.	Total Mean Height. Of Out-buildings.	Cubical Contents of each Cottage. Of each Cottage, including Foundations and Roofs.	Cubical Contents of each Cottage. Of Out-buildings.	Cubical Contents of each Cottage. Total.	Nature of Water Supply to be provided by Contractor.	Length of Drains to be provided by Contractor.	Allowance for Hauling to be done or paid for by Contractor.	Total estimated Cost of each Cottage, including Hauling.
2430	EDWIN CLARKE:—	Ft. Ft.	Feet.	Ft. Ft.	Feet.	Feet.	Feet.					Feet.		£. s.
	Living room	13 ×12	156	..	..									
	Scullery	9¼× 9	83¼	..	..									
	Pantry	6 × 5	30	..	..									
	Fuel	6 × 2½	15	..	..	23	9	10,150	350	10,500	Well, or Norton's tube well.	45	Assumed to be done by tenant of farm.	114 11
	1st bedroom	..	..	12 ×8¼	99									
	2nd ditto	..	..	12 ×7⅓	88									
	3rd ditto	..	..	9½×9	85½									
6344	CENTRAL COTTAGE IMPROVEMENT SOCIETY:—													
	Living room	12 ×12	144	..	..									
	Scullery	12 × 6	72	..	..									
	Pantry	6 × 5	30	..	..	25	13	9,537	350	9,887	Nothing said.	Nothing said.	Nothing said.	87 10
	Fuel	7 × 6	42	..	..									
	1st bedroom	..	..	12×12	144									
	2nd ditto	..	..	12× 9	108									
	3rd ditto	..	..	12× 9	108									
6855	JAMES MARTIN:—													
	Living room	12⅓×12	148	..	..									
	Scullery	13 × 8	104	..	..									
	Pantry	8 × 3	24	..	..									
	Ditto	6¼× 3	19	..	..	24	9	8,893	908	9,801	600-gallon tank for rain-water.	40	To be done by tenant of farm.	110 0
	1st bedroom	..	..	12 × 8½	102									
	2nd ditto	..	..	9½× 7½	71¼									
	3rd ditto	..	..	18½× 8	148									

made on the estates, and are supplied by the owners at the cost of raising or making only, or where the carriage of materials is done without charge by the tenantry, or where the labour is performed by estate journeymen to the saving of the tradesman's profit, the cost may be less than $3\frac{1}{4}d.$ per foot, and may approach the figures quoted by exhibitors, though at the same time such instances form no criterion of the cost ordinarily prevailing. If $3\frac{1}{4}d.$ per cubic foot be admitted to be the average cost throughout the country, the three designs for which prizes have been given, taken in the order in which they stand in the catalogue, will cost as follows:—

	£.	s.	d.		£.
No. 2430	284	7	6	instead of	230 per pair.
No. 6844	267	15	6	"	175 " "
No. 6855	265	9	0	"	220 " "

These figures are given in order that it may not be supposed that the judges have been influenced by the prices stated by competitors, nor that they would mislead the public by appearing to confirm sums which do not represent the general average cost. This remark has been particularly called forth by observing amongst the plans entered for competition one pair of cottages giving extraordinary large accommodation, the cost of which is estimated at 185*l.*, which, upon close examination of the detail figures given, the judges were of opinion could not be erected under ordinary circumstances for so little as the highest priced pair of cottages for which a prize was given.

Hay and Corn Sheds, and Covered Sheds for Storing Manure.—The number of competitors for the prizes offered for these objects was even less than in the case of labourers' cottages, and as the competition was limited to the covering of hay, corn, and manure without reference to stock or connection with the homestead the duties of the Judges were limited simply to the consideration of the suitability of proposed materials, their durability, and cost.

Mr. Jackson of Tattenhall Hall, near Chester, exhibited a well-executed model of his existing homestead, which provides for the storing of hay and corn in sheaf under slate roofs. It was the only exhibit of roofing of this material, and although the arrangement of the homestead was in some particulars such as the Judges could not approve, they considered that, having regard to economy and convenience, the character of covering provided by Mr. Jackson was such as to deserve the first prize. In this commendation they especially refer to the Dutch barns erected in connection with the homestead for stacking corn in sheaf at harvest time, and which would also serve for storing hay and straw. They unanimously disapproved of the arrangement of placing hay in the loft over the cows in the shippon, though the exhibitor has made special provision for ventilation by a shaft through the hay and roof from the shippon below, as well as by perforations in the walls just under the loft.

Several specimens and models were exhibited of other descriptions of roofing, both of iron and felt. The corrugated iron roofing shown by Messrs. Morton and Co. of Liverpool was excellent in its character, and afforded a very good means of comparing its special advantages with those of felt, when properly laid with boards upon light lattice girders or principals. In the case of corrugated iron the nature and form of the covering materials call for very little additional support of ties and principals, while in the case of felt the covering material being light in itself admits of the principals being also light and comparatively cheap. The durability of the corrugated iron roofing compared with that of felt will probably be in the proportion of 3 to 1, and this comparison is only admissible on the assumption that the iron is painted every third year, and the felt tarred every other year.

The first prize of 10*l.* being awarded to Mr. Jackson for the model of his existing slate roofing on timber framing, it is desirable that that description of

covering should be compared as to durability and cost with that of iron and felt, in order to explain the grounds of the adjudication of the second prize of 5*l.* to the felt roofing in preference to that of iron. Slate roofing being familiar to all persons, it is unnecessary to describe the mode of construction adopted by Mr. Jackson, which professes no specialty. The cost per square of ground covered (10 feet by 10 feet) may be taken at 5*l.* 0*s.* 10*d.*, or rather over 1*s.* per foot. Messrs. Morton's example of galvanized corrugated curved iron roofing on wrought iron framing was tied together by the ordinary wrought iron rods with king-post-rod and key. The cost per square of ground covered is stated to be 3*l.* 18*s.*, or nearly 9½*d.* per foot, including wall-plates. The felt roofing of Messrs. McTear and Co. of Belfast, was in the form of an arc of a circle, of which they state the pitch should be 1¼ inch per foot, preserved in its shape by a girder formed of "bows and strings," with lattice work between them tied by a solid web of timber equal to one-fifth of the span, to give extra strength to the bearings. These lattice girders are from 8 to 10 feet apart; on these are purlins 22 inches apart, covered with a sheeting of half-inch boards in long lengths, and from 9 to 15 inches broad, upon which is laid the felt, which is again covered with tar or varnish properly prepared. Messrs. McTear and Co. state that they have covered spaces 75 feet in width with perfect satisfaction, and will undertake to cover a width of 100 feet without any intermediate supports. The cost per square of ground covered, including wall plates, is stated to be 1*l.* 12*s.*, or nearly 4*d.* per foot. The period of durability of slate roofing may be stated to be at least fifty years, that of iron twenty-two years, and that of felt eight years; the first requiring no other act of maintenance than ordinary repairs, the second requiring strict attention in painting to preserve it from the corroding effects of uprising vapours, and the third, in addition to repairs, requiring a coat of tar or prepared varnish every other year to preserve it from the effects of the sun and weather. The question of economy is not therefore determined by the first cost, but must have special reference to the periods of duration of each description of material; for as the roof will require to be replaced at the termination of each period, it is necessary that the principal money first expended should be repaid within such periods. The true state of the case as respects economy will be understood, therefore, by comparing the annual amounts per square of ground covered, which must be gained to repay the cost within the periods mentioned, and calculating the value of money at 5 per cent. interest they are as follows:—

	s.	*d.*	
Slate	5	6	
Iron	5	10	with painting once in 3 years.
Felt	4	11	with tarring once in 2 years.

Each is liable to ordinary repairs, iron and slate requiring very little indeed, and felt requiring more.

Thatch-substitute.—Messrs. Morton and Co. exhibited a very ingenious arrangement for the use of galvanized corrugated iron for covering hay and corn stacks, which they have named the "Thatch Substitute." The corrugated covering is made in sheets of different lengths and widths, the width varying from 2 to 2½ feet, and the length according to the size of the stacks in ordinary use, two lengths extending from ridge to eave. It is intended that all the sheets required for the covering of a stack should be of one size, and capable of being packed in a box and stored away. They are connected together by twisted-iron lashing-cords threaded through eye-bolts, which connect the sheets with longitudinal strips of wood, which are laid on the stack where the covering-sheets join. Along the ridge there is galvanized capping, which is connected also by the same eye-bolts through which the cord runs. The cords are long enough to reach to the ground on each side of the stack, where they are fastened to anchored winders, which strain the cords and keep the whole tied

together. These winders are placed 10 feet apart at the foot of the stack on each side. The strips at the junction of the plates through which the eye-bolts pass occupy the place of rafters on the stack roof, and, if made deep enough, allow of any heat from the stack to pass between the hay or corn and the covering, though, if this was doubtful, larger pieces of wood of the character of purlins might run longitudinally along the stack, and so keep the covering away from the hay or corn.

The cost of the "Thatch Substitute" for a stack 18 feet wide is 9*s.* per foot run, or 6*d.* per foot of ground covered, exclusive of the cost of frequently painting the iron, which must be necessarily done.

Assuming that the "Thatch Substitute" with the extra wear and tear consequent upon frequent shiftings and carelessness in treatment by labourers will not last more than twelve years, the cost to a purchaser who must charge himself with repayment of the original outlay within that period will be quite double the cost of ordinary thatching when everything is considered. The advantage of the invention will therefore not be due to any saving on this head, but to the readiness and quickness with which a stack may be covered by any labourer unacquainted with thatching, which will commend it to many practical men.

With the approval of the Stewards, a silver medal was given for this invention.

John Coleman.
J. S. Watson.
J. Bailey Denton.

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7. *Report of the Judges of Miscellaneous Implements.*

We consider the show of implements in this department of extreme interest to the members of the Society. The number of entries in the catalogue was larger than at any other meeting of the Society, amounting to 7724, and of a most varied character. We were much struck with the exquisite finish of many agricultural machines, showing that the manufacturers are fully alive to the necessity of fitting agricultural machinery with as much nicety as the most important machines for manufactures. We observed that many of the most noted houses in the trade have come to the determination to simplify every movement, so that it may be well understood, and easily rectified by an ordinary farm labourer—who, we may remark in passing, whatever may have been said to the contrary, has generally shown an extraordinary appreciation of *good* implements, and a desire to use them efficiently. Had we not been requested by the stewards to leave unnoticed implements which were placed under other classes, we should have felt it our duty to make some remarks on them. Still there were some points which we could not pass over, and we would suggest that, in future, Judges in the Miscellaneous Class should be left comparatively unfettered, as there are oftentimes special portions of implements, not perfectly efficient in themselves, but which might be adapted to other implements, and thus be made of great value to the agriculturist.

Great latitude must necessarily be given to us, as the immense variety of utensils, implements, and machines requires great discrimination in making the awards. We would respectfully suggest, therefore, that some classification be made in future, so that the duties of the Judges may be somewhat lightened. When it is understood that the length of shedding was over four miles, and that all this was positively filled with implements, some conception may be formed of the labour undergone in selecting implements and inventions for notice; and we sincerely hope that our heavy duties may be pleaded as some excuse for the imperfections that we have doubtless been guilty of, and that we may be judged leniently by the Society, the exhibitors, and the public at

large. Our object has been to reward improvements in agricultural implements, and, at the same time, to encourage the production of machinery and inventions which bear on the general improvement of the land.

We were empowered to award 10 silver medals, but three of them had been specially requested by Judges in other departments, and we proceed to state in detail the awards we made of the seven medals retained by us.

We gave a medal to Richard Winder, of Farningham, Dartford, Kent, No. 2136, Stand 101, described as "Machine for folding sheep, where netting is used;" invented, improved, and manufactured by the exhibitor. Price, with 1 roller, 5*l.*; wrought-iron corner-posts, 10*s.*; extra rollers, 15*s.* each; netting, 6*d.* per lineal yard. The netting is unwound from the roller when making the fold, and wound on it to remove the fold; all is done quickly and easily by one man. We think this a most useful implement for sheep-farming on a large scale.

Another was awarded to Richmond and Chandler, Saltford, for No. 885, Stand 56, for "One-Horse gear." Price 11*l.* 10*s.*; especially adapted for driving small machines. This is a light useful implement for small occupations. A medal was given to Messrs. McKenzie and Sons, of Dublin, Belfast, and Cork, for a new implement, No. 2400, Stand 107, "a Patent 2-row Turnip and Mangold Sower." Price 7*l.* 7*s.* A brass roller, with several grooves for different seeds, is made to revolve against the bottom of the hopper, the seed is delivered continuously, and is very simple in construction. A medal was awarded also to a most useful weighing-machine for farmsteads, and for other purposes, exhibited by Messrs. Pooley, of Liverpool and Manchester, No. 6166, Stand 263. It can be erected by a labourer, requires no foundations, and can at once be converted into a cattle-weighing machine. The price, 27*l.* 10*s.*, puts it within the reach of most farmers; and it would be of the greatest use for weighing coal, artificial manures, oilcake, and the manure drawn from the farmyard. Another medal was awarded to an Earth-Boring Machine, exhibited by Messrs. Mather and Platt, of Manchester, No. 7608, Stand 377. This machine may not strictly be called one for agricultural purposes, but it was doing some extraordinary work, smashing through a hard bed of rock and gravel, and pumping up the debris in a wonderful manner; it will be of invaluable assistance to gentlemen who have large estates with a deficient supply of water, as it will bore through any stratum, and sink a well of large capacity. During a period of drought like last year, to many farms and villages it would be of great importance. A medal was also given to Aveling and Porter, of Rochester, for their "Improved Steam Road-Roller," No. 4301, Stand 184. This weighs 15 tons, and rolls 6 feet in width. It turns in its own length; the front rollers are so contrived as to adjust themselves to the inequalities of the road. As good roads are an important element in agricultural advancement, we considered we were justified in rewarding this extremely clever and useful invention.

We conclude stating the awards of Medals by specially noticing the "Eureka Smut and Separating Machine," invented by S. Howes of New York, exhibited by Messrs. Nell, Harrison, and Co., of Aldermanbury, London, No. 6514, Stand 292. This was so excellent in its work, and of such value to farmers and corn-dealers, that we laid its merits before the Council, and recommended it for a *Gold Medal*, and we are happy to record that they unanimously supported us; and this was the only special gold medal given at the Show. The price of the machine is 30*l.*; and when the amazing power of it is considered, and the splendid work it achieved, the above price is very moderate—the separation of the dust, smut, and other impurities being perfect.

Amongst the High Commendations we must not omit to mention a Horse Pitchfork, invented by E. Z. Walker, of the United States, for lifting hay or loose corn off carts or waggons, and depositing it on the stack or in the barn.

With some simplification of the pulleys, we believe this little instrument will be made of great use when ricks have arrived at a height where the hay, &c., has to be raised overhead. The price is 2*l.* 2*s.* only, and it was exhibited by Messrs. Coleman and Morton, of Chelmsford, No. 594, Stand 42.

Another of the High Commendations we must specially notice, No. 6161, Stand 263, exhibited by Messrs. Pooley, of Liverpool—"a Patent Automatic Grain-weighing and Registering Machine." This is a most ingenious contrivance, and will be of great use to corn merchants, maltsters, and on very large occupations. It weighs, records, and discharges by the sole momentum of the grain in the process of being weighed. Another High Commendation was given to Mr. Love, of Northampton, for an excellent sheep crib, No. 1395, Stand 85. It is a self-regulating feeder, and is a very useful article for all sheep and cattle feeders. A thatch-sewing machine was ingenious; but as the day is not far distant when we hope ranges of shedding will be erected on most farmsteadings for storing corn, its necessity may not be so important.

We ought to mention the glass-bottle lubricators for mowing-machines, used by Messrs. Burgess and Key, and which are great acquisitions, especially in the saving of oil. Then we noticed the new patent knife-bar of Hunt and Pickering's mowing machines, exhibited to show the new bottom-knife fixed in each finger by the aid of screws, and easily replaced.

We must also speak of the powerful work done by the direct-acting steam-pump, No. 6448, Stand 288. Neither must we forget the iron framing for threshing-machines, used by Messrs. Roby, and also by the Messrs. Clayton and Shuttleworth.

The Stand No. 52 of A. Ransome and Co., of Chelsea, deserved our visit, for the saw-benches, &c., acted with the greatest precision, and we think will effect what is greatly needed, namely, well-made machinery at a moderate cost, for fitting up doors, windows, &c., at a cheaper rate than those now made by hand. Lawn hurdles can also be produced very cheaply.

We were requested, in addition to our other duties, to judge the Dairy Utensils, with two local gentlemen appointed by the Manchester Local Committee. Some difficulty was experienced by us, as there was no perfectly complete collection both for cheese and butter, and the Stewards determined to give a prize of 3*l.* for a collection, and 5*l.* to be divided into a first prize of 2*l.* for the best churn, and three other prizes of 1*l.* each to the three next best churns. The 3*l.* was awarded to Messrs. Hawkes, of Knutsford, and the 2*l.* for a churn to Mr. Thomas Bradford, for his Counter Current Churn, No. 2964, Stand 129. This was worked by a very simple movement of a treadle and lever, and did its work well. On removing the churn, and placing a block in its place, it could be used as a mincer, and meat-chopper. The other three prizes were given to Messrs. Johnston, No. 2924; Waide, No. 2603; and Taylor, No. 2297. There was nothing novel about these churns. A trial was invited of churns in action, and ten competitors met on Friday morning. The trials were of peculiar interest, and we regret that, as we were unable to properly make up the butter for market, we cannot report satisfactorily to the Council, but we would earnestly suggest that a complete trial should be made next year under proper regulations. We are convinced it would be watched with great interest, and would be of the greatest importance to dairy farmers and to the public generally. With our best thanks to the Stewards of our Department for their unwearied assistance and kindness, we subscribe ourselves,

John Kersley Fowler,
H. B. Caldwell,
F. Sherborn.

Statistics of the Country Meetings from 1864 to 1869 inclusive.

NEWCASTLE, 1864.

Prices of Admission.	Days of Admission.	Persons.	Amount Received. £. s. d.	Received for Catalogues. £. s. d.
Trial Yard, 5s.	Saturday, July 16	66	16 5 6	9 14 0
Implement and Cattle Yards, 10s.	Monday, ,, 18	731	365 0 0	95 18 0
Ditto, 2s. 6d. ..	Tuesday, ,, 19	10,224	1279 10 9	203 17 0
Ditto, 2s. 6d. ..	Wednesday, ,, 20	15,949	1995 13 4	196 0 0
Ditto, 1s.	Thursday, ,, 21	56,902	2846 16 11	168 19 0
Ditto, 1s.	Friday, ,, 22	30,811	1542 6 1	50 1 6
		114,683	8045 12 7	724 9 6

Total: Number of Persons 114,683
Amount received for Admissions .. £8,045 12 7

PLYMOUTH, 1865.

Prices of Admission.	Days of Admission.	Persons.	Amount Received. £. s. d.	Received for Catalogues. £. s. d.
Trial Yard, 5s.	Saturday, July 15	25	6 5 0	2 11 0
Implement and Cattle Yards, 5s.	Monday, ,, 17	1,063	265 16 0	59 6 0
Ditto, 2s. 6d. ..	Tuesday, ,, 18	4,767	595 11 10	89 14 0
Ditto, 2s. 6d. ..	Wednesday, ,, 19	17,269	2159 0 0	112 6 6
Ditto, 1s.	Thursday, ,, 20	42,943	2147 14 10	58 16 6
Ditto, 1s.	Friday, ,, 21	21,969	1099 12 7	20 4 0
		88,036	6274 0 3	342 18 0

Total: Number of Persons 88,036
Amount received for Admissions .. £6,274 0 3

BURY ST. EDMUNDS, 1867.

Prices of Admission.	Days of Admission.	Persons.	Amount Received. £. s. d.	Received for Catalogues. £. s. d.
Trial Yard, 5s.	Wednesday, July 10	37	9 5 0	..
	Thursday, ,, 11	87	21 15 0	..
	Friday, ,, 12	105	26 8 0	..
	Saturday, ,, 13	38	10 0 0	..
Implement and Cattle Yards, 5s.	Monday, ,, 15	910	227 15 0	..
Ditto, 2s. 6d. ..	Tuesday, ,, 16	4,465	558 2 6	..
Ditto, 2s. 6d. ..	Wednesday, ,, 17	7,886	985 15 0	..
Ditto, 1s.	Thursday, ,, 18	33,126	1656 6 0	..
Ditto, 1s.	Friday, ,, 19	15,183	759 3 0	..
		61,837	4254 9 6	346 7 0

Total: Number of Persons 61,837
Amount received for Admissions .. £4,254 9 6

LEICESTER, 1868.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.			Received for Catalogues.		
			£.	*s.*	*d.*	£.	*s.*	*d.*
Trial Yard, 5*s*... ..	Wednesday, July 15	102	25	10	0	7	10	0
Implement and Cattle Yards, 5*s*.	Thursday, ,, 16	3,096	774	18	0	141	9	0
Ditto, 2*s*. 6*d*. ..	Friday, ,, 17	10,457	1312	2	9	159	1	0
Ditto, 2*s*. 6*d*. ..	Saturday, ,, 18	6,088	768	18	2	56	17	0
Ditto, 1*s*.	Monday, ,, 20	52,829	2647	7	10	105	10	0
Ditto, 1*s*.	Tuesday, ,, 21	24,566	1227	18	8	38	12	0
		97,138	6771	0	5	508	19	0

TOTAL: Number of Persons 97,138
Amount received for Admissions .. £6,771 0 5

MANCHESTER, 1869.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.			Received for Catalogues.		
			£.	*s.*	*d.*	£.	*s.*	*d.*
Implement Yard, 2*s*. 6*d*.	Friday, July 16; Saturday, ,, 17	1,588	198	9	6	29	0	0
Implement and Cattle Yards, 5*s*.	Monday, ,, 19	2,343	586	3	6	148	4	0
Ditto, 5*s*.	Tuesday, ,, 20	12,960	3,242	14	3	190	0	0
Ditto, 2*s*. 6*s*. ..	Wednesday, ,, 21	39,405	4,953	1	1	291	1	6
Ditto, 1*s*.	Thursday, ,, 22	57,129	2,863	7	11	207	12	6
Ditto, 1*s*.	Friday, ,, 23	39,285	1,966	7	2	79	6	9
Ditto, 1*s*.	Saturday, ,, 24	36,392	1,817	0	5	109	17	7
Ditto, 10*s*. 6*d*. ..	Season tickets from the 19th to 24th	11,631	1,432	2	0	..		
		200,733	17,059	5	10	1055	2	4

TOTAL: Number of Persons 200,733
Amount received for Admissions £17,059 5 10

Royal Agricultural Society of England.

1869.

President.

H.R.H. THE PRINCE OF WALES.

Trustees.

Acland, Sir Thomas Dyke, Bart., *Killerton Park, Exeter, Devonshire.*
Berners, Lord, *Keythorpe Hall, Leicester.*
Bramston, Thomas William, *Skreens, Chelmsford, Essex.*
Challoner, Colonel, *Portnall Park, Staines, Middlesex.*
Chesham, Lord, *Latimer, Chesham, Bucks.*
Marlborough, Duke of, K.G., *Blenheim Park, Oxford.*
Portman, Lord, *Bryanston, Blandford, Dorset.*
Powis, Earl of, *Powis Castle, Welshpool, Montgomeryshire.*
Rutland, Duke of, K.G., *Belvoir Castle, Grantham, Leicestershire.*
Speaker, The Rt. Hon. the, *Ossington, Newark-on-Trent, Notts.*
Thompson, Harry Stephen, *Kirby Hall, York.*
Tredegar, Lord, *Tredegar Park, Newport, Monmouthshire.*

Vice-Presidents.

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Cathcart, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
Chichester, Earl of, *Stanmer Park, Lewes, Sussex.*
Egmont, Earl of, *Cowdray Park, Petworth, Sussex.*
Eversley, Viscount, *Heckfield Place, Winchfield, Hants.*
Hill, Viscount, *Hawkstone Park, Salop.*
Jonas, Samuel, *Chrishall Grange, Saffron Walden, Essex.*
Kerrison, Sir Edward C., Bart., *Brome Hall, Scole, Suffolk.*
Miles, Sir William, Bart., *Leigh Court, Bristol, Somersetshire.*
Richmond, Duke of, K.G., *Goodwood, Chichester, Sussex.*
Walsingham, Lord, *Merton Hall, Thetford, Norfolk.*

Other Members of Council.

*Acland, Thomas Dyke, M.P., *Sprydoncote, Exeter, Devonshire.*
Amos, Charles Edwards, 5, *Cedars Road, Clapham Common, Surrey.*
*Baldwin, John, *Luddington, Stratford-on-Avon, Warwickshire.*
*Barnett, Charles, *Stratton Park, Biggleswade, Bedfordshire.*
Barthropp, Nathaniel George, *Hacheston, Wickham Market, Suffolk.*
Booth, Thomas Christopher, *Warlaby, Northallerton, Yorkshire.*
Bowly, Edward, *Siddington House, Cirencester.*
*Cantrell, Charles S., *Riding Court, Datchet, Bucks.*
*Clayden, John, *Littlebury, Saffron Walden, Essex.*

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* Those Members of the Council whose names are prefixed by an asterisk retire by rotation in July, but are eligible for re-election in May.

Clive, George, M.P., *Perrystone, Ross, Herefordshire.*
Davies, David Reynolds, *Mere Old Hall, Knutsford, Cheshire.*
*Dent, J. D., M.P., *Ribston Hall, Wetherby, Yorkshire.*
Devonshire, Duke of, K.G., *Holker Hall, Lancashire.*
Druce, Joseph, *Eynsham, Oxford.*
Edmonds, William John, *Southrop, Lechlade, Gloucestershire.*
Gibbs, B. T. Brandreth, *Halfmoon Street, Piccadilly, London,* W.
Hassall, William, *Bubney, Whitchurch, Salop.*
Holland, Edward, *Dumbleton Hall, Evesham, Gloucestershire.*
Hornsby, Richard, *Spittle Gate, Grantham, Lincolnshire.*
Hoskyns, Chandos Wren, *Harewood, Ross, Herefordshire.*
Hutton, William, *Gate Burton, Gainsboro', Lincolnshire.*
Kesteven, Lord, *Caswick, Stamford, Lincolnshire.*
*Kingscote, Colonel, M.P., *Kingscote, Wootton-under-Edge, Gloucestershire.*
Lawes, John Bennet, *Rothamsted, St. Albans, Herts.*
Lichfield, Earl of, *Shugborough, Staffordshire.*
*Liddell, Hon. Henry George, M.P., *Ravensworth Castle, Durham.*
*Lopes, Sir Massey, Bart., M.P., *Maristow, Roborough, Devon.*
Macdonald, Sir Archibald Keppel, Bart., *Woolmer Lodge, Liphook, Hants.*
*Milward, Richard, *Thurgarton Priory, Southwell, Notts.*
*Pain, Thomas, *Ugford Cottage, Salisbury, Wilts.*
Randell, Charles, *Chadbury, Evesham, Worcestershire.*
*Ransome, Robert Charles, *Ipswich, Suffolk.*
*Rigden, William, *Hove, Brighton, Sussex.*
Sanday, William, *Holmepierrepont, Notts.*
Shuttleworth, Joseph, *Hartsholme Hall, Lincoln.*
*Stone, N. Chamberlain, *Aylestone Hall, Leicester.*
*Torr, William, *Aylesby Manor, Great Grimsby, Lincolnshire.*
*Turner, George, *Brampford Speke, Exeter, Devonshire.*
*Vane, Sir Henry Ralph, Bart., *Hutton Hall, Penrith, Cumberland.*
*Vernon, Lord, *Sudbury Hall, Derby.*
*Wallis, Owen, *Overstone Grange, Northampton.*
*Webb, James, *Spring Hill, Fladbury, Pershore, Worcestershire.*
Wells, William, M.P., *Holmewood, Peterborough, Northamptonshire.*
*Western, Sir Thomas B., Bart., *Felix Hall, Kelvedon, Essex.*
*Wilson, Major Fuller Maitland, *Stowlangtoft Hall, Bury St. Edmund's, Suffolk.*
*Wilson, Jacob, *Woodhorn Manor, Morpeth, Northumberland.*
*Wilson, Professor, *Iver, Uxbridge, Bucks.*
*Wynn, Sir Watkin Williams, Bart, M.P., *Wynnstay, Rhuabon, Denbighshire.*

Secretary and Editor.

H. M. JENKINS, 12, *Hanover Square, London,* W.

Consulting Chemist—Dr. Augustus Voelcker, 11, *Salisbury Square,* E.C.
Veterinary Inspector—James Beart Simonds, *Royal Veterinary College,* N.W.
Consulting Engineer—James Easton, or C. E. Amos, *Grove, Southwark,* S.E.
Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.
Publisher—John Murray, 50, *Albemarle Street,* W.
Bankers—The London and Westminster Bank, *St. James's Square Branch,* S.W.

* Those Members of the Council whose names are prefixed by an asterisk retire by rotation in July, but are eligible for re-election in May.

STANDING COMMITTEES FOR 1869.

Finance Committee.

BRIDPORT, Viscount, Chairman.
BRAMSTON, T. W.
KINGSCOTE, Colonel, M.P.
RANDELL, CHARLES.
TORR, WILLIAM.

House Committee.

THE PRESIDENT.
CHAIRMAN of Finance Committee.
CHESHAM, Lord.
BRAMSTON, T. W.
CHALLONER, Colonel.
GIBBS, B. T. BRANDRETH.
TORR, WILLIAM.

Journal Committee.

THOMPSON, H. S., Chairman.
CATHCART, Earl, Vice-Chairman.
SPEAKER, The Rt. Hon. the.
KERRISON, Sir E. C., Bt.
ACLAND, T. DYKE, M.P.
DENT, J. D., M.P.
HOLLAND, ED.
HOSKYNS, C. WREN.
MILWARD, RICHARD.
WILSON, JACOB.

Chemical Committee.

WELLS, WILLIAM, M.P., Chairman.
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VERNON, Lord.
KERRISON, Sir E. C., Bt.
LOPES, Sir MASSEY, Bt., M.P.
VANE, Sir H., Bt.
ACLAND, T. DYKE, M.P.
DAVIES, D. R.
DENT, J. D., M.P.
HOLLAND, ED.
HOSKYNS, C. WREN.
HUXTABLE, Ven. Archdeacon.
LAWES, J. B.
THOMPSON, H. S.
WILSON, JACOB.

Veterinary Committee.

BRIDPORT, Viscount, Chairman.
LIDDELL, Hon. H. G., M.P.
VANE, Sir H., Bt.
CHALLONER, Colonel.
DENT, J. D., M.P.
GIBBS, B. T. BRANDRETH.
PAIN, THOS.
SIMONDS, Professor.
SPOONER, Professor.
VARNELL, Professor.
WELLS, WILLIAM, M.P.
WILSON, JACOB.

Stock-Prizes Committee.

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CHESHAM, Lord.
KESTEVEN, Lord.
WALSINGHAM, Lord.
LIDDELL, Hon. H. G., M.P.
BALDWIN, JOHN.
BARNETT, CHARLES.
BARTHROPP, NATHANIEL G.
BOOTH, T. C.
BOWLY, EDWARD.
CLAYDEN, JOHN.
DAVIES, D. R.
DENT, J. D., M.P.
DRUCE, JOSEPH.
GIBBS, B. T. BRANDRETH.
HASSALL, WM.
HOLLAND, ED.
JONAS, SAMUEL.
MILWARD, RICHARD.
PAIN, THOMAS.
RANDELL, CHAS.
RIGDEN, WM.
SANDAY, WM.
TORR, WILLIAM.
TURNER, GEORGE.
WEBB, JAMES.
WILSON, JACOB.
The Stewards of Live Stock.

Implement Committee.

CHALLONER, Col., Chairman.
CATHCART, Earl.
BRIDPORT, Viscount.
VERNON, Lord.
KERRISON, Sir E. C., Bt.
MACDONALD, Sir A. K., Bart.
AMOS, C. E.
CANTRELL, CHAS. S.
DRUCE, JOSEPH.
GIBBS, B. T. BRANDRETH.
HOLLAND, ED.
HORNSBY, RICHARD.
HOSKYNS, C. WREN.
RANDELL, CHARLES.
RANSOME, R. C.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
THOMPSON, H. S.
TORR, WILLIAM.
WILSON, Professor.
WILSON, JACOB.
The Stewards of Implements.

General Manchester Committee.

RICHMOND, Duke of, Chairman.
RUTLAND, Duke of.
LICHFIELD, Earl of.
POWIS, Earl of.
BRIDPORT, Viscount.
CHESHAM, Lord.
KESTEVEN, Lord.
PORTMAN, Lord.
TREDEGAR, Lord.
VERNON, Lord.
WALSINGHAM, Lord.
LIDDELL, Hon. H. G., M.P.
HESKETH, Sir T., Bt., M.P.
KERRISON, Sir E. C., Bt.
VANE, Sir H. R., Bt.
WYNN, SIR W. WILLIAMS, Bt., M.P.
AMOS, C. E.
BARNETT, CHARLES.
BOWLY, EDWARD.
CANTRELL, CHARLES S.
CHALLONER, Colonel.
CLAYDEN, JOHN.
DAVIES, D. R.
DENT, J. D., M.P.
GIBBS, B. T. BRANDRETH.
HOLLAND, ED.
HORNSBY, RICHARD.
HOSKYNS, C. WREN.
MANCHESTER, The Mayor of.
MILWARD, RICHARD.
PAIN, THOMAS.
RANDELL, CHARLES.
RANSOME, R. C.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
STATTER, THOS.
STONE, N. C.
THOMPSON, H. S.
TORR, WILLIAM.
WEBB, JAMES.
WELLS, WILLIAM, M.P.
WHITWORTH, HENRY.
WILSON, Major.
WILSON, JACOB.
The Stewards.

Show-Yard Contracts Committee.

RANDELL, CHARLES, Chairman.
CATHCART, Earl.
BRIDPORT, Viscount.
VERNON, Lord.
AMOS, C. E.
GIBBS, B. T. BRANDRETH.
HORNSBY, RICHARD.
MILWARD, RICHARD.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
THOMPSON, H. S.
TORR, WILLIAM.

Committee of Selection.

RICHMOND, Duke of.
CATHCART, Earl.
POWIS, Earl of.
BRIDPORT, Viscount.
WALSINGHAM, Lord.
SPEAKER, Right Hon. the.
CLAYDEN, JOHN.
DENT, J. D., M.P.
DRUCE, JOSEPH.
EDMONDS, W. J.
HOLLAND, ED.
MILWARD, R.
RANDELL, CHARLES.
THOMPSON, H. S.
TORR, WILLIAM.
WELLS, WILLIAM, M.P.

Education Committee.

LICHFIELD, Earl of.
POWIS, Earl of.
BRIDPORT, Viscount.
ACLAND, T. DYKE, M.P.
DENT, J. D., M.P.
HOLLAND, ED.
HOSKYNS, C. WREN.
KINGSCOTE, Col., M.P.
WELLS, WILLIAM., M.P.
WILSON, Professor.
VOELCKER, Dr.

Cattle Plague Committee.

THE WHOLE COUNCIL.

*** The PRESIDENT, TRUSTEES, and VICE-PRESIDENTS are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, Hanover Square, Wednesday, December 9, 1868.

REPORT OF THE COUNCIL.

Since the last General Meeting in May, 2 Governors and 38 Members have died, and 3 Governors and 237 new Members have been elected, so that the Society now consists of

75 Life Governors,
75 Annual Governors,
1400 Life Members,
3947 Annual Members, and
14 Honorary Members,

making a total of 5511, being an increase of 49 names.

His Grace the Duke of Richmond, K.G., has been elected a Vice-President in the room of the late Marquis of Downshire, and the Earl of Lichfield a Member of Council in the room of the late Earl of Shrewsbury and Talbot.

The half-yearly statement of accounts to the 30th June, 1868, has been examined and approved by the Auditor and Accountants of the Society, and has been furnished to all Members in the last number of the 'Journal.' The funded capital stands at 16,027*l.* 19*s.* 7*d.* in the New Three per Cents. The collection of the arrears of subscription has been steadily progressing, the amount now due, inclusive of those in arrear for the current year, being 1050*l.*

In consequence of the lamented death of Mr. Frere, the late Editor, it has been necessary to make temporary provision for carrying on the 'Journal' work, and the Council are glad to have secured the services of Mr. Goodwin, the Secretary of the Bath and West of England Society, to bring out the last and the next numbers. The arrangements connected with filling up the vacant post of Editor having been the subject of much discussion, it was

finally resolved that after the 1st January, 1869, the offices of Editor and Secretary should be held by the same gentleman. An advertisement was therefore issued inviting candidates, and from forty-six names the Council have selected Mr. H. M. Jenkins, F.G.S., to fill the post of Editor and Secretary of the Society, from the 1st January next, at a salary of 600*l.* per annum, with residence in the House of the Society. Mr. Jenkins is at present discharging the duties of Assistant-Secretary, Curator, and Librarian of the Geological Society of London, and of Editor of the 'Quarterly Journal' of that Society, and Sub-Editor of the 'Quarterly Journal of Science.'

The Council have resolved, that on the termination of their engagement with Mr. Henry Hall Dare, he be presented with 600*l.* They have recorded their sense of the ability and integrity he has displayed in carrying out the duties of his office, and their regret that a change in the arrangements of the Society has necessitated his retirement.

The Leicester Meeting was in every way eminently successful, and the number of visitors who thronged the Show-yard gave evident proof that the interest taken in the Society's Country Meetings remains unabated, while the enormous entry of Implements appears a satisfactory indication that the present quinquennial classification for trial and prizes in no way interfered with the variety and general excellence of the Exhibition. The trial of Steam-ploughs proved a source of great attraction, both on account of the extraordinary character of the work done, and the handsome offer of a gold cup by his Highness the Viceroy of Egypt, which was ultimately awarded to Messrs. Fowler.

The Mayor and Corporation of Leicester, and the Local Committee, used every exertion to forward the wishes of the Society during the preparations for the Meeting, and the period of holding it. The Council have also to acknowledge the courtesy of the County Magistrates in giving the use of the Judges' Lodgings for the use of the Stewards of the Society during their stay in Leicester. On the Sunday during which the stock was in the yard, Divine Service for the servants and men employed was performed by the Vicar of the parish.

The grant of 200*l.* for the Improvement of Agricultural Education has been continued for the ensuing year. The scheme of the present year will be adopted in 1869, with some amendments

in the details. Candidates must send in their names on or before the 18th March, and the Examinations will take place in the Society's house in the week commencing Monday, 12th April.

The Country Meeting at Manchester will be held in the week commencing Monday the 19th July, and will close on Saturday the 24th. Prizes to the amount of 2930*l.* are offered by the Society for Live Stock, and 1516*l.* has been added by the Manchester Local Committee, including Classes for heavy and light weight carrying Hunters; for leaping over hurdles and water; for Cleveland, Dray, Carriage, and Cart Horses; for Roadsters and Ponies; for the Yorkshire dairy cross, Ayrshire, polled Angus or Aberdeen, polled Galloway, West Highland, Welsh, and Kerry breeds of Cattle; for Cheviot, Limestone, Border Leicester, and Black-faced Scotch Sheep; and for both British and Foreign Cheese and Butter.

The Prize Sheet for Implements for trial at Manchester in 1869, which was issued in July last, comprising mowing, reaping, and hay-making machines, hay-collectors, horse-rakes, carts, waggons, and liquid manure-carts, has been supplemented by the addition of prizes for the class of carriages with low body adapted for moving stock, implements, &c., on a farm, in the most convenient form, and for the class of sheaf-binding machines. A Gold Medal has also been offered for the best system of drying Corn and Hay in wet weather, sufficiently economical for practical purposes. The Manchester Local Committee also offer prizes for the best broad-cast distributor of guano or other manure, to be worked by one or two horses; for the best machine for potato-getting; for the best plans or models of labourers' cottages, of hay or corn sheds, and of covered sheds for storing manure; for dairy utensils; for harness for a pair of horses for agricultural purposes; and for the best illustration of the principle of shoeing.

The Council have ordered a Schedule of the Members of Council, showing in proper form the Districts (from A to H), and the number of Members they represent, to be inserted in the current number of the 'Journal.'

By order of the Council,

H. HALL DARE, Secretary.

Royal Agricultural Society of England.

February, 1869.

DISTRIBUTION OF MEMBERS OF THE SOCIETY AND OF MEMBERS OF COUNCIL.

Districts.	Counties.	Number of Members.		Number in Council.		Members of Council.
A.	Durham	95	..	1		Hon. H. Liddell.
	Northumberland ..	174	..	1		Jacob Wilson.
	Yorkshire—North and East Ridings	107	..	2		Earl Cathcart, V.P.; T. C. Booth.
			376		4	
B.	Cumberland	69	..	1		Sir H. Vane.
	Lancashire	159	..	3		Duke of Devonshire; Sir T. Hesketh; T. Statter.
	Westmoreland ..	25				
	Yorkshire — West Riding	141	..	2		H. S. Thompson, T.; J. D. Dent.
			394		6	
C.	Derbyshire	60	..	1		Lord Vernon.
	Leicestershire ..	160	..	3		Lord Berners, T.; Duke of Rutland, T.; N. C. Stone.
	Lincolnshire ..	179	..	5		R. Hornsby; W. Hutton; Lord Kesteven; J. Shuttleworth; W. Torr.
	Northamptonshire	87	..	1		O. Wallis.
	Nottinghamshire ..	119	..	3		The Speaker, T.; R. Milward; W. Sanday.
	Rutlandshire ..	15				
	Warwickshire ..	143	..	1		J. Baldwin.
			763		14	
D.	Bedfordshire ..	45	..	1		C. Barnett.
	Cambridgeshire ..	65				
	Essex	126	..	4		T. W. Bramston, T.; S. Jonas, V.P; J. Clayden; Sir T. Western.
	Hertfordshire ..	95	..	1		J. B. Lawes.
	Huntingdonshire ..	33	..	1		W. Wells.
	Norfolk	174	..	1		Lord Walsingham, V.P.
	Suffolk	218	..	4		Sir E. Kerrison, V.P.; N. Barthropp; R. C. Ransome; Major Wilson.
			756		12	

DISTRIBUTION OF MEMBERS OF THE SOCIETY—*continued.*

Districts.	Counties.	Number of Members.	Number in Council.	Members of Council.
E.	Berkshire	111 ..	1	Viscount Bridport, V.P.
	Buckinghamshire ..	53 ..	3	Lord Chesham, T.; C. S. Cantrell; Professor Wilson.
	Hampshire	131 ..	2	Viscount Eversley, V.P.; Sir A. Macdonald.
	Kent	211		
	Middlesex	280 ..	1	B. T. Brandreth Gibbs.
	Oxfordshire	101 ..	2	Duke of Marlborough, T.; J. Druce.
	Surrey	142 ..	2	Colonel Challoner, T.; C. E. Amos.
	Sussex	134 ..	4	Earl of Chichester, V.P.; Earl of Egmont, V.P.; Duke of Richmond, V.P.; W. Rigden.
		—— 1163	— 15	
F.	Cornwall	55		
	Devonshire	126 ..	4	Sir T. Acland, T.; T. D. Acland; Sir M. Lopes; G. Turner.
	Dorsetshire	79 ..	1	Lord Portman, T.
	Somersetshire ..	116 ..	1	Sir W. Miles, V.P.
	Wiltshire	95 ..	1	T. Pain.
		—— 471	— 7	
G.	Gloucestershire ..	157 ..	4	E. Bowly; W. J. Edmonds, E. Holland; Col. Kingscote.
	Herefordshire ..	122 ..	2	G. Clive; C. Wren Hoskyns.
	Monmouthshire ..	36 ..	1	Lord Tredegar, T.
	Worcestershire ..	124 ..	2	C. Randell; James Webb.
	South Wales	95		
		—— 534	— 9	
H.	Cheshire	99 ..	1	D. R. Davies.
	Shropshire	172 ..	2	Viscount Hill, V.P.; W. Hassall.
	Staffordshire ..	152 ..	1	Earl of Lichfield.
	North Wales ..	88 ..	2	Earl of Powis, T.; Sir W. Wynn.
		—— 511	— 6	
Scotland		65		
Ireland		74		
Channel Islands		12		
Foreign Countries		52		
Members without addresses		55		
		—— 258		

DR. HALF-YEARLY CASH ACCOUNT

	£.	s.	d.	£.	s.	d.	£.	s.	d.
To Balance in hand, 1st July, 1868:—									
Bankers				1,320	9	9			
Secretary				16	3	3			
							1,336	13	0
To Deposit withdrawn				..	..		2,000	0	0
To Income:—									
Dividends on Stock				234	8	2			
Interest on Deposit				18	15	10			
Subscriptions:—									
Governors' Life-Compositions ..	90	0	0						
Governors' Annual	15	0	0						
Members' Life-Compositions ..	239	0	0						
Members' Annual	629	2	0						
				973	2	0			
Journal:—									
Sales by Murray	110	6	10						
Advertisements	27	10	6						
				137	17	4			
							1,364	3	4
To Country Meetings:—									
Leicester				....	..		7,395	18	0
							£1,2096	14	4

BALANCE-SHEET,

LIABILITIES.	£.	s.	d.	£.	s.	d.
To Capital:—						
Surplus, 30th June, 1868	..	..		21,977	13	1
Less Surplus of Expenditure over Income during the Half-year:—						
Expenditure	2,663	19	10			
Income	1,364	3	4			
				1,299	16	6
				20,677	16	7
To Leicester Meeting:— Difference between Receipts and Expenditure, the former exceeding the latter by	..	..		592	12	9
				£21,270	9	4

BRIDPORT, *Chairman of Finance Committee.*
QUILTER, BALL, & Co.

FROM 1ST JULY TO 31ST DECEMBER, 1868. Cr.

	£. s. d.	£. s. d.	£. s. d.
By Expenditure:—			
Establishment—			
Official Salaries and Wages	344 18 0		
House Expenses, Rent, Taxes, &c.	350 14 7		
		695 12 7	
Journal:—			
Printing, Maps, &c.	526 7 0		
Stitching (two Numbers)	150 1 6		
Postage and Delivery	140 10 0		
Prize Essays	45 0 0		
Other Contributions	107 4 0		
Editorship	85 7 6		
		1,054 10 0	
Chemical:—			
Consulting Chemist's Salary		150 0 0	
Postage and Carriage		18 12 9	
Advertisements		37 13 6	
Subscription paid in error, returned		1 1 0	
Gratuity to Mr. Hall Dare on leaving		600 0 0	
Country Meeting Plant		106 10 0	
			2,663 19 10
By Country Meetings:—			
Leicester		8,342 0 9	
Manchester		73 16 3	
			8,415 17 0
By Balance in hand, 31st December, 1868:—			
Bankers		1,006 16 10	
Secretary		10 0 8	
			1,016 17 6
			£12,096 14 4

31ST DECEMBER, 1868.

ASSETS.	£. s. d.
By Cash in hand	1,016 17 6
By New 3 per Cent. Stock 16,027*l.* 19*s.* 6*d.* cost*	15,379 15 7
By Books and Furniture in Society's House	2,000 0 0
By Country Meeting Plant	2,800 0 0
By Manchester Meeting, preliminary expenses	73 16 3
	£21,270 9 4

* *Value at* $92\frac{5}{8}$=£14,845 18*s.* 3*d.*

Mem.—The above Assets are exclusive of the amount recoverable in respect of arrears of Subscription to 31st December, 1868, which at that date amounted to 1,146*l.*

Examined, audited, and found correct, this 9th day of February, 1869.

A. H. JOHNSON,
FRANCIS SHERBORN,
HENRY CANTRELL,
} *Auditors on behalf of the Society.*

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

YEARLY CASH ACCOUNT, FROM 1ST JANUARY TO 31ST DECEMBER, 1868.

DR.

	£. s. d.	£. s. d.	£. s. d.
To Balance in hand, 1st Jan. 1868:—			
Bankers	. .	329 16 4	
Secretary	. .	19 17 2	349 13 6
To Income, viz.:—			
Interest on Deposit Account	. .	18 15 10	
Dividends on Stock	. .	468 16 4	
Subscriptions:—			
Governor's Life-Compositions	90 0 0		
Governors' Annual	395 0 0		
Members' Life-Compositions	589 0 0		
Members' Annual	3,658 9 0	4,732 9 0	
Journal:—			
Sales by Murray	110 6 10		
Advertisements	43 14 0	151 0 10	5,374 2 0
To Country Meetings:—			
Bury St. Edmund's	. .	8 4 0	
Leicester	. .	11,445 8 6	11,453 12 6
			£ 17,177 8 0

CR.

	£. s. d.	£. s. d.	£. s. d.
By Expenditure:—			
Establishment—			
Official Salaries and Wages	689 16 0		
House Expenses, Rent, Taxes, &c.	706 16 5	1,396 12 5	
Journal:—			
Printing, Maps, &c.	937 9 0		
Postage, Delivery, &c.	249 10 0		
Stitching (Three Numbers)	228 2 2		
Prize Essays	80 0 0		
Other Contributions	214 15 6		
Advertising	6 18 6		
Wrapper for three Parts	27 0 0		
Editorship	335 7 6	2,079 2 8	
Chemical:—			
Grant for Investigations	200 0 0		
Consulting Chemist's Salary	300 0 0	500 0 0	
Veterinary:—			
Grant to Royal Veterinary College (half year)	100 0 0		
Professor Ernes, for Report on Veterinary Congress at Vienna	10 0 0	110 0 0	
Education	. .	211 13 0	
Postage and Carriage	. .	52 4 7	
Advertisements	. .	41 1 0	
Subscriptions received in error by Bankers returned	. .	7 4 0	
Gratuity to Mr. Hall Dare upon leaving	. .	600 0 0	
Country Meeting Plant	. .	106 10 0	5,104 7 8
By Country Meetings—			
Bury St. Edmund's	. .	191 9 6	
Leicester	. .	10,790 17 1	
Manchester	. .	73 16 3	11,056 2 10
By Balance in hand, 31st Dec., 1868:—			
Bankers	. .	1,006 16 10	
Secretary	. .	10 0 8	1,016 17 6
			£ 17,177 8 0

Receipts.

	£.	s.	d.
Subscription from Leicester	2,000	0	0
Admissions to Show Yard	6,771	0	5
Sale of Catalogues	540	5	7
Implement Exhibitors' Payments for Shedding	1,401	0	6
Non-Members' Fees for entry of Implements	104	10	0
Fees for entry of Live-Stock	368	15	0
Fees for Horse Boxes	161	0	0
Fees for entry of Butter, Cheese, and Wool	7	10	0
Fines for Non-Exhibition of Live Stock	17	10	0
Fines for Non-Exhibition of Implements	19	15	0
Extra lines in Implement Catalogue	16	17	0
Nurse Cows	10	0	0
Sales of Hay	27	0	0
	£11,445	3	6

Expenditure.

	£.	s.	d.	£.	s.	d.
Show Yard:—Additions and Repairs toPlant*	209	16	4			
Carriage and Storeage of Plant, Erecting, taking to pieces and packing ditto	198	9	5			
Implement Sheddling	1,521	0	0			
Outside Fencing, Stock Sheds, Horse Boxes, and General Works	2270	4	4			
Surveyor	133	10	6			
				4,333	0	7
Trial Fields:—Sundry Works, 15*l.* 3*s.* 9*d.*; Surveyor, 5*l.* 5*s.*; Tents, 11*l.* 4*s.* 6*d.* Coals, 12*l.*; Plough Traces, 3*l.* 6*s.*; Fixing Pumps, 2*l.*; Hire of Scales, 12*s.* 6*d.*				49	11	9
Judges: Implement, 275*l.* 13*s.* 8*d.*; Stock, 280*l.*; Wool, 4*l.* 4*s.*; Cheese and Butter, 4*l.* 4*s.*				561	1	8
Consulting Engineer's Assistants				142	7	6
Veterinary-Inspectors, 71*l.*; Inspectors of Shearing, 20*l.*				91	0	0
Metropolitan Police				163	6	9
Clerks: Secretary, 35*l.* 14*s.*; Hon. Director, 50*l.* 9*s.* 5*d*; Bankers, 21*l.*; Post Office, 10*l.* 10*s.*				117	13	5
Assistant Stewards: Implements, 34*l.* 13*s.*; Stock, 10*l.*				44	13	0
Foremen of Departments				68	19	10
Yardmen, 154*l.* 18*s.* 6*d.*; Fieldmen, 13*l.* 15*s.*; Grooms, 8*l.*				176	13	6
Index-Clerk and Money-takers, 77*l.* 4*s.*; Money-changer, Door-keepers, 33*l.* 12*s.*; Cloak-room and Parcels Office Attendants 13*l.*				123	16	0
Lodgings for Stewards, Judges, &c.				156	18	0
Refreshments for ditto				139	0	0
Catalogues: Implements, 261*l.* 17*s.*; Awards, 8*l.* 9*s.*: Stock, 83*l.* 3*s.*; Awards, 58*l.* 10*s.* 6*d.*; Packing Cases and Carriage, 13*l.* 9*s.*; Sellers, 27*l.* 6*s.*				455	14	6
Printing Prize-sheets, Certificates, Admission-Orders, Tickets, Railway Papers, Labels, Circulars, Programmes, &c.				226	18	0
Advertising—Newspapers, 190*l.* 11*s.* 3*d.*; Railways and Bill-Posting, 101*l.* 18*s.*				292	9	3
Postage, Carriage and Stationery				91	5	0
Repairs, Insurance and Carriage of Testing Machines				65	9	5
Hay, 70*l.* 10*s.*; Straw, 207*l.* 11*s.* 4*d.*; Insurance of ditto, 1*l.* 4*s.* 6*d.*; Green Food, 273*l.* 11*s.* 4*d.*				552	17	2
Drivers and Forage for Horses in Trial Fields				57	3	9
Fly Hire for Stewards and Judges				15	0	6
Hire of Steam Tackle, 5*l.*; Hire of Tent, 14*l.*; Hire of Chairs, 5*l.*				24	0	0
Tan, 3*l.* 8*s.* 3*d.*; Tar'd Line, 3*l.* 8*s.* 4*d.*; Clay, 1*l.* 13*s.*; Sundries, 7*l.* 2*s.* 2*d.*				15	11	9
Shorthand Writer, 7*l.* 2*s.*; Firemen, 2*l.* 17*s.* 6*d.*				9	19	6
Rosettes				8	2	6
Official Staff				12	1	5
Prizes—Implements, 460*l.*; Stock, 2480*l.*; Medals, 19*l.* 16*s.*				2,959	16	0
				10,957	10	9
By Balance, namely—Balance of Receipts and Payments to 31st Dec., 1868	592	12	9			
Less Conditional Prizes unpaid	105	0	0			
				487	12	9
				£11,445	3	6

* The sum of 106*l.* 10*s.* for new Store Room and Ladies' Cloak Room is not included in this Account, but is charged to the General Funds of the Society.

BRIDPORT, *Chairman of Finance Committee.*

MEMORANDA.

ADDRESS OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, May 22nd, 1869, at Twelve o'clock.

MEETING at Manchester, in July, 1869.

GENERAL MEETING in London, in December, 1869.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

WEEKLY COUNCIL (for practical communications), at 12 o'clock on all Wednesdays in February, March, April, May, June, July, and November, excepting the first Wednesday in each of those months, and during adjournment: open to all Members of the Society, who are particularly invited by the Council to avail themselves of this privilege.

ADJOURNMENTS.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

DISEASES of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society; and of sending animals to the Royal Veterinary College, on the same terms as if they were subscribers to the College.—(A statement of these privileges will be found in the present Appendix.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in the Appendix of the present volume.

LOCAL CHEQUES.—Members are particularly requested not to forward Country Cheques for payment in London; but London Cheques, or Post-office Orders on Vere-street (payable to H. M. JENKINS), in lieu of them. All Cheques are required to bear upon them a penny draft or receipt stamp, which must be cancelled in each case by the initials of the drawer. They may also conveniently transmit their Subscriptions to the Society, by requesting their Country Bankers to pay (through their London Agents) the amount at the Society's Office (No. 12, Hanover Square, London), between the hours of ten and four, when official receipts, signed by the Secretary, will be given for such payments.

NEW MEMBERS.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specifiy in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary.

PACKETS BY POST.—Packets not exceeding two feet in length, width, or depth, consisting of written or printed matter (but not containing letters sealed or open), if sent without envelopes, or enclosed in envelopes open at each end, may be forwarded by the inland post, if stamped, at the following rates:—One Penny for every quarter of a pound or fraction of a quarter of a pound.

*** Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-Laws, of a Statement of the General Objects, &c., of the Society, of Chemical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Manchester Meeting, 1869:

ON MONDAY THE 19TH OF JULY, AND FOLLOWING DAYS.

SCHEDULE OF PRIZES.

I.—Live-Stock Prizes offered by the Society.

Special Prizes offered by the Manchester Local Committee are marked thus *.

Reference Number in Certificates.	HORSES.	First Prize.	Second Prize.	Third Prize.
Class.		£.	£.	£.
1	Agricultural Stallion, foaled before 1st Jan. 1867, *not qualified to compete as Clydesdale or Suffolk*	25	15	5
2	Agricultural Stallion, foaled in the year 1867, *not qualified to compete as Clydesdale or Suffolk*	20	10	5
3	Clydesdale Stallion, foaled before the 1st Jan. 1867	25	15	5
4	Clydesdale Stallion, foaled in the year 1867 ..	20	10	5
5	Suffolk Stallion, foaled before the 1st of Jan. 1867	25	15	5
6	Suffolk Stallion, foaled in the year 1867	20	10	5
7	Thorough-bred Stallion, suitable for getting hunters	100	25	10
8	Stallion, not less than 14 hands 2 inches, nor exceeding 15 hands 2 inches, suitable for getting Hackneys	25	15	5
9	Stallion, suitable for getting Coach horses	25	15	5
10	Pony Stallion, under 14 hands 2 inches	20	10	5
11	Mare, in foal, or with foal at foot, suitable for breeding Hunters	25	15	5
12	Hunter, Mare or Gelding, over four years old, up to not less than 14 stones	*20	*10	..
13	Hunter, Gelding, four years old	*20	*10	..
14	Hunter, Mare, four years old	*20	*10	..
15	Hunter, Mare or Gelding, three years old	*15	*10	..
16	Hunter, Mare or Gelding, not less than four years old, up to not less than 12 stones	*20	*10	..
	*To the best Hunter in any of the preceding classes, in addition to the prize, a Special Prize of 30*l*., or plate to that value.			
	*Six Silver Cups, value 10*l*. each, will be given for competition by Hunters, which shall be decided to be the best performers over hurdles			
	No Third Prize will be given unless at least Six animals be exhibited, except on the special recommendation of the Judges.			

Reference Number in Certificates	HORSES—*continued.*	First Prize.	Second Prize.	Third Prize.
Class.		£.	£.	£.
	and water, in a paddock adjoining the Show-yard, in the following order, viz.:—			
	Three Silver cups value 10*l.* each, on the Monday, Wednesday, and Friday of the week of Show, to the best of the *heavy weight* carrying Hunters; and Three Silver Cups of same value, on the Tuesday, Thursday, and Saturday, for the best of the *light weight* carrying Hunters.			
17	Mare, not less than 14 hands 1 inch, nor exceeding 15 hands 1 inch, in foal, or with foal at foot, suitable for breeding Hackneys	20	10	5
18	Pair of Carriage Horses, Mares or Geldings, to be shown in harness if required by the Judges ..	*20	*10	..
19	Brougham Horse, Mare or Gelding, to be shown in harness if required by the Judges	*10	*5	..
20	Colt, Gelding or Filly, likely to make a Carriage Horse, foaled in 1866	*10	*5	..
21	Roadster, Mare or Gelding, not exceeding 15 hands 1 inch, four years old and upwards	*15	*10	..
22	Roadster, Mare or Gelding, not exceeding 15 hands, above four years old	*10	*5	..
23	Pony Mare, not exceeding 14 hands	15	10	5
24	Pony, Mare or Gelding, not exceeding 13 hands 2 inches	*10	*5	..
25	Agricultural Mare and Foal, *not qualified to compete as Clydesdale or Suffolk*	20	10	5
26	Clydesdale Mare and Foal	20	10	5
27	Suffolk Mare and Foal	20	10	5
28	Brood Mare, Cleveland breed	*15	*10	..
29	Agricultural Filly, three years old, *not qualified to to compete as Clydesdale or Suffolk*	15	10	..
30	Clydesdale Filly, three years old	15	10	..
31	Suffolk Filly, three years old	15	10	..
32	Agricultural Filly, two years old, *not qualified to compete as Clydesdale or Suffolk*	15	10	..
33	Clydesdale Filly, two yeare old	15	10	..
34	Suffolk Filly, two years old	15	10	..
35	Pair of Heavy Dray Horses, Mares or Geldings, belonging to one person or firm	*25	*15	..
36	Pair of Horses, Mares or Geldings, not less than 16 hands, suitable for Brewers' Drays .. .. [*The Prizes in this Class are given by the Brewers of the district.*]	*25	*15	..
37	Dray Horse, Mare or Gelding, of the heavy breed	*10	*5	..
38	Pair of Horses, Mares or Geldings, for Agricultural purposes	*20	*10	..
39	Horse, Mare or Gelding, for Agricultural purposes	*10	*5	
	No Third Prize will be given unless at least Six animals be exhibited, except on the special recommendation of the Judges.			

Reference Number in Certificates. Class.	CATTLE. (All Ages calculated to July 1st, 1869).	First Prize. £.	Second Prize. £.	Third Prize. £.
	SHORTHORN.			
40	Bull, above three years old	40	20	10
41	Bull, above two and not exceeding three years old	25	15	5
42	Yearling Bull, above one and not exceeding two years old	25	15	5
43	Bull-Calf, above six and not exceeding twelve months old	10	5	..
44	Cow, above three years old	20	10	5
45	Heifer, in-milk or in-calf, not exceeding three years old	15	10	5
46	Yearling Heifer, above one and not exceeding two years old	15	10	5
47	Heifer-Calf, above six and under twelve months old	10	5	..
	HEREFORD.			
48	Bull, above three years old	25	15	5
49	Bull, above two and not exceeding three years old	25	15	5
50	Yearling Bull, above one and not exceeding two years old	25	15	5
51	Bull-Calf, above six and not exceeding twelve months old	10	5	..
52	Cow, above three years old	20	10	5
53	Heifer, in-milk or in-calf, not exceeding three years old	15	10	5
54	Yearling Heifer, above one and not exceeding two years old	15	10	5
55	Heifer-Calf, above six and under twelve months old	10	5	..
	DEVON.			
56	Bull, above three years old	25	15	5
57	Bull, above two and not exceeding three years old	25	15	5
58	Yearling Bull, above one and not exceeding two years old	25	15	5
59	Bull-Calf, above six and not exceeding twelve months old	10	5	..
60	Cow, above three years old	20	10	5
61	Heifer, in-milk or in-calf not exceeding three years old	15	10	5
62	Yearling Heifer, above one and not exceeding two years old	15	10	5
63	Heifer-Calf, above six and under twelve months old	10	5	..
	No Third Prize will be given in Classes 40 *to* 63 *unless at least Six animals be exhibited, except on the special recommendation of the Judges.*			

Reference Number in Certificates.	CATTLE—*continued.*	First Prize.	Second Prize.	Third Prize.
Class.	**CHANNEL ISLANDS.**	£.	£.	£.
64	Bull, above one year old	15	10	..
65	Cow, above three years old	15	10	..
66	Heifer, in-milk or in-calf, not exceeding three years old	15	10	..
	OTHER ESTABLISHED BREEDS.			
..	*Not including the Shorthorn, Hereford, Devon, or Channel Islands Breeds.*			
67	Bull, above one year old	15	10	..
68	Cow, above three years old	15	10	..
69	Heifer, in-milk or in-calf, not exceeding three years old	15	10	..
..	*No Second Prize will be given in Classes* 64 *to* 69 *unless at least Six animals be exhibited, except on the special recommendation of the Judges.*			
	YORKSHIRE DAIRY CROSS.			
70	Pair of Cows, above three years old, in-milk or in-calf	*15	*10	..
71	Pair of Heifers, above two and not exceeding three years old, in-milk or in-calf	*10	*5	..
72	Pen of Three Rearing Calves, calved within the year 1869	*8	*4	..
	AYRSHIRE.			
73	Bull, two years old and upwards	*15	*10	..
74	Pair of Cows, three years and upwards, in-milk or in-calf	*15	*10	..
75	Pair of Heifers, two years old and under three years, in-milk or in-calf	*15	*10	..
	POLLED ANGUS OR ABERDEEN.			
76	Bull, two years old and upwards	*15	10	..
77	Pair of Cows, three years old and upwards, in-milk or in-calf	*15	*10	..
78	Pair of Heifers, two years old and under three years, in-milk or in-calf	*15	*10	..
	POLLED GALLOWAY.			
79	Bull, two years old and upwards	*15	*10	..
80	Pair of Cows, three years old and upwards, in-milk or in-calf	*15	*10	..
81	Pair of Heifers, two years old and under three years, in-milk or in-calf	*15	*10	..

Reference Number in Certificates.	CATTLE—*continued.*	First Prize.	Second Prize.	Third Prize.
	WEST HIGHLAND.			
Class.		£.	£.	£.
82	Bull, two years old and upwards	*15	*10	..
83	Pair of Cows, three years old and upwards, in-milk or in-calf	*15	*10	..
84	Pair of Heifers, two years old and under three years, in-milk or in-calf	*15	*10	..
	WELSH.			
85	Bull, two years old and upwards	*15	*10	..
86	Pair of Cows, three years old and upwards, in-milk or in-calf	*15	*10	..
87	Pair of Heifers, two years old and under three years, in-milk or in-calf	*15	*10	..
	KERRY.			
88	Pair of Cows, three years old and upwards, in-milk or in-calf	*15	*10	..
	SHEEP.			
	LEICESTER.			
89	Shearling Ram	20	10	5
90	Ram of any other age	20	10	5
91	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	COTSWOLD.			
92	Shearling Ram	20	10	5
93	Ram of any other age	20	10	5
94	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	LINCOLN AND OTHER LONG-WOOLLED.			
	Not qualified to compete as Leicester or Cotswold.			
95	Shearling Ram	20	10	5
96	Ram of any other age	20	10	5
97	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	OXFORDSHIRE DOWN.			
98	Shearling Ram	20	10	5
99	Ram of any other age	20	10	5
100	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	No Third Prize will be given for Rams in Classes 89 *to* 100 *unless at least Six animals be exhibited, nor in the Ewe Classes unless Six Pens be exhibited, except on the special recommendation of the Judges.*			

Reference Number in Certificates.	SHEEP—*continued.*	First Prize.	Second Prize.	Third Prize.
Class.	SOUTHDOWN.	£.	£.	£.
101	Shearling Ram	20	10	5
102	Ram of any other age	20	10	5
103	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	SHROPSHIRE.			
104	Shearling Ram	20	10	5
105	Ram of any other age	20	10	5
106	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	HAMPSHIRE AND OTHER SHORT-WOOLLED *Not qualified to compete as Southdown or Shropshire.*			
107	Shearling Ram	20	10	5
108	Ram of any other age	20	10	5
109	Pen of Five Shearling Ewes, of the same flock ..	15	10	5
	LONK.			
110	Shearling Ram	20	10	5
111	Ram of any other age	20	10	5
112	Pen of Five Ewes	15	10	5
	HERDWICK.			
113	Shearling Ram	20	10	5
114	Ram of any other age	20	10	5
115	Pen of Five Ewes	15	10	5
	No Third Prize will be given for Rams in Classes 101 *to* 115 *unless at least Six animals be exhibited, nor in the Ewe Classes unless Six Pens be exhibited, except on the special recommendation of the Judges.*			
	CHEVIOT.			
116	Shearling Ram	*10	*5	..
117	Ram of any other age	*10	*5	..
118	Pen of Five Shearling Ewes	*10	*5	..
	No Second Prize will be given to Classes 116 *to* 118 *for Rams unless at least Three animals be exhibited, nor in the Ewe Class unless Three Pens be exhibited, except on the special recommendation of the Judges.*			

Reference Number in Certificates.	SHEEP—*continued.*	First Prize.	Second Prize.	Third Prize.
Class.	LIMESTONE.	£.	£.	£.
119	Shearling Ram	*10	*5	..
120	Ram of any other age	*10	*5	..
121	Pen of Five Shearling Ewes	*10	*5	..
	BORDER LEICESTER.			
122	Shearling Ram	*10	*5	..
123	Ram of any other age	*10	*5	..
124	Pen of Five Shearling Ewes	*10	*5	..
	BLACKFACED SCOTCH.			
125	Ram of any age	*10	*5	..
126	Pen of Five Shearling Ewes	*10	*5	..
	No Second Prize will be given for Rams in Classes 119 *to* 126, *unless at least Three animals be exhibited, nor in the Ewe Classes unless Three Pens be exhibited, except on the special recommendation of the Judges.*			
	PIGS.			
127	Boar of a large white breed, above twelve months old	10	5	..
128	Boar of a large white breed, above six months and not exceeding twelve months old	10	5	..
129	Boar of a small white breed, above twelve months old	10	5	..
130	Boar of a small white breed, above six months and not exceeding twelve months old	10	5	..
131	Boar of a small black breed	10	5	..
132	Boar of the Berkshire breed	10	5	..
133	Boar of a breed not eligible for the preceding classes	10	5	..
134	Breeding Sow of a large white breed	10	5	..
135	Breeding Sow of a small white breed	10	5	..
136	Breeding Sow of a small black breed	10	5	..
137	Breeding Sow of the Berkshire breed	10	5	..
138	Breeding Sow of a breed not eligible for the preceding classes	10	5	..
139	Pen of three Breeding Sow-Pigs of a large white breed, of the same litter, above four and under eight months old	10	5	..
140	Pen of three Breeding Sow-Pigs of a small white breed, of the same litter, above four and under eight months old	10	5	..

Reference Number in Certificates.	PIGS—*continued.*	First Prize.	Second Prize.	Third Prize.	Fourth Prize.
Class.		£.	£.	£.	£.
141	Pen of three Breeding Sow-Pigs of a small black breed, of the same litter, above four and under eight months old ..	10	5	..	..
142	Pen of three Breeding Sow-Pigs of the Berkshire breed, of the same litter, above four and under eight months old	10	5	..	..
143	Pen of three Breeding Sow-Pigs of a breed not eligible for the preceding classes, of the same litter, above four and under eight months old	10	5	..	..
	BUTTER.				
	Open to the United Kingdom.				
144	3 lbs. of Fresh Butter, made up in ½ lbs.	*6	*4	*3	*2
	A Silver Cup, value 5*l.*, will be added to the First Prize.				
145	Tub or Crock of Butter, not less than 14 lbs. in weight	*7	*5	*3	..
	FOREIGN.				
146	Tub or Crock of Butter, not less than 14 lbs. in weight, the produce of any foreign country	*7	*5	*3	..
	A Silver Cup, value 5*l.*, will be added to the First Prize, for the best Tub or Crock of either British or Foreign make. The Exhibitor to be the manufacturer and *bonâ fide* owner of the Butter and Stock from which it is made, with the exception of Foreign. Merchants or dealers may compete, stating name or brand by which the Butter so entered is known, and where made.				
	CHEESE.				
	Open to the United Kingdom.				
	UNCOLOURED CHEESE, MADE IN 1868.				
147	Four Cheeses, above 60 lbs. weight each ..	*15	*10	..	..
148	Four Cheeses, under 60 lbs. weight each ..	*10	*5	..	..

Reference Number in Certificates.	CHEESE—*continued.*	First Prize.	Second Prize.	Third Prize.
	COLOURED CHEESE, MADE IN 1868.			
Class.		£.	£.	
149	Four Cheeses, above 60 lbs. weight each	*15	*10	..
150	Four Cheeses, under 60 lbs. weight each	*10	*5	..
	COLOURED OR UNCOLOURED, MADE IN 1869.			
151	Four Cheeses, above 60 lbs. weight each	*15	*10	..
152	Four Cheeses, under 60 lbs. weight each	*10	*5	..
	FOREIGN CHEESE, COLOURED OR UNCOLOURED.			
153	Four Cheeses of any size or weight, of any Foreign make	*15	*10	..
	A Special Champion Prize of 25*l.* will be awarded to the best Four Cheeses of 1868 in the whole exhibition, British or Foreign, in addition to any other prize they may have received.			
	A Special Champion Prize of 25*l.* will be awarded to the best Four Cheeses of 1869 in the whole exhibition, British or Foreign, in addition to any other prize they may have received.			

CONDITIONS RELATING TO LIVE STOCK.

Cattle.

1. No bull above two years old will be eligible for a prize unless certified to have served not less than three different cows (or heifers) within the three months preceding the 1st of June in the year of the Show.

2. All bulls above one year old shall have rings or "bull-dogs" in their noses, and be provided with leading sticks.

3. No cow will be eligible for a prize unless certified to have had a live calf, either between the date of entry and that of the Show, or within the twelve months preceding the date of the Show.

4. No heifer, except yearlings, entered as in-calf, will be eligible for a prize unless she is certified to have been bulled before the 31st of March in the year of the Show, nor will her owner afterwards receive the prize until he shall have furnished the Secretary with a further certificate that she produced a live calf before the 31st of January in the subsequent year.

Horses.

5. All foals must be the offspring of the mare along with which they are exhibited.

6. No veterinary inspection of horses will be required except when considered necessary by the Judges, who will be accompanied by the Veterinary Inspectors.

7. The hunters and hacks in Classes 12, 13, 14, 15, and 16, and the ponies in Classes 23 and 24, must all be ridden during the Show, and must therefore be provided with saddles and bridles.

8. A charge of 1*l.* for the accommodation of a horse-box will be made for each entry for stallions and mares in-foal, or with foals at foot, which includes hay, straw, and green fodder.

9. A charge of 10*s.* will be made for the accommodation of a stall for each entry in the other horse Classes, which includs hay, straw, and green fodder.

Sheep.

10. All rams, except shearlings, must have been used in the present season.

11. Sheep exhibited for any of the prizes must have been *really and fairly shorn bare* after the 1st of April in the year of the Exhibition; and the date of such shearing must form part of the Certificate of Entry. Two Inspectors will be appointed by the Council to examine the sheep on their admission to the Show-Yard, with instructions to report to the Stewards any cases in which the sheep have not been *really and fairly shorn bare.*

Pigs.

12. The three sow-pigs in each pen must be of the same litter.

13. The breeding sows in Classes 134, 135, 136, 137, and 138, shall be certified to have had a litter of live pigs within the six months preceding the Show, or to be in-pig at the time of entry, so as to produce a litter before the 1st of September following. In the case of in-pig sows, the prize will be withheld until the Exhibitor shall have furnished the Secretary with a certificate of farrowing, as above.

14. No sow, if above eighteen months old, that has not produced a litter of live pigs, shall be eligible to compete in any of the classes.

15. The Judges of pigs will be instructed, with the sanction of the Stewards, to withhold prizes from any animals which shall appear to them to have been entered in a wrong class.

16. All pigs exhibited at the country meetings of the Society shall be subjected to an examination of their mouths by the Veterinary Inspector of the Society; and should the state of dentition in any pig indicate that the age of the animal has not been correctly returned in the Certificate of Entry, the Stewards shall have power to disqualify such pig, and shall report the circumstance to the Council at its ensuing monthly meeting. No pig shall be oiled or coloured while in the Show-Yard.

17. If a litter of pigs be sent with a breeding sow, the young pigs must be the produce of the sow, and must not exceed two months old.

18. All disqualifications will be published in the awards of the Judges.

CONDITIONS RELATING TO CHEESE.

1. The Exhibitor in every case to be the manufacturer and *bonâ fide* owner of the cheese, and stock from which it is made, except in the case of foreign cheese, which may be exhibited by merchants and dealers; but the brand by which it is known, and where manufactured, must be stated in these cases.

2. Any Exhibitor may compete for both coloured and uncoloured cheese by exhibiting four cheeses in each class; but should the same Exhibitor have a prize awarded to his cheese in both classes, the lowest prize, or one of the two, shall be withheld from him and given to the next in merit, so that no Exhibitor shall receive more than one prize, except in the case of the Champion Prize.

3. No special entry is required for the Champion Prize, as it will be selected from any of the lots exhibited, British or Foreign.

4. Any cheese which has been bored before being exhibited in the Show-yard, will disqualify the lot in which it is found from competition.

5. The Manchester Local Committee reserve the privilege of purchasing any of the prize cheese at a price to be fixed by the Judges.

RULES OF ADJUDICATION.

1. As the object of the Society in giving prizes for sheep and pigs is to promote improvement in *breeding* stock, the Judges in making their awards will be instructed not to take into their consideration the present value to the butcher of animals exhibited, but to decide according to their relative merits for the purpose of *breeding.*

2. If, in the opinion of the Judges, there should be equality of merit, they will be instructed to make a special report to the Council, who will decide on the award.

3. The Judges will be instructed to withhold any prize if they are of opinion that there is not sufficient merit in any of the stock exhibited for such prize to justify an award.

4. The Judges will be instructed to give in a *reserved number* in each class of live stock; viz., which animal would, in their opinion, possess sufficient merit for the prize in case the animal to which the prize is awarded should subsequently become disqualified.

5. In the classes for stallions, mares, and fillies, the Judges in awarding the prizes will be instructed, in addition to symmetry, to take activity and strength into their consideration.

II.—Implement and Machinery Prizes offered by the Society.

MACHINES AND IMPLEMENTS FOR THE HARVESTING OF CROPS.

I. Mowing Machines.

	£.
For the Class of Mowing Machines for two horses	50
Ditto ditto one horse	30

II. Hay-making Machines.

For the Class of Hay-making Machines	30

III. Hay Collectors.

For the Class of Hay Collectors	15

IV. Reaping Machines.

For the Class of Reaping Machines, with self-delivery in sheaf, clear of the horse-track	60
Ditto ditto ditto in swathe ditto	60
Ditto ditto without self-delivery	30
Ditto Combined Reaping and Grass Mowing Machines	30
Ditto One-horse Reapers	30

V. Horse Rakes.

For the Class of Horse Rakes	30

VI. Waggons.

For the Class of Pair-horse Waggons	30
Ditto Other Waggons	20

VII. Carts.

For the Class of Single-horse Carts	20
Ditto Two-horse Carts	20
Ditto Harvest Carts	15
Ditto Market Carts on springs	10
Ditto Liquid Manure Carts	10

VIII. Carriages.

For the Class of Carriages with low body, adapted for moving stock, implements, &c., on a farm in the most convenient form	20

IX. Sheaf-binding Machines.

For the Class of Sheaf-binding Machines	20

X. Drying Corn and Hay.

For the best system for drying Corn and Hay in wet weather, sufficiently economical for practical purposes	Gold medal

XI. Miscellaneous.

Awards to Agricultural articles, and essential improvements therein	(10 silver medals)

III.—Special Prizes offered by the Manchester Local Committee.

	First Prize.	Second Prize.	Third Prize.
	£.	£.	£.
Broadcast Distributor of Guano or other Manure, to be worked by one or two horses	10	..	..
Machine for Potato Getting, to be worked by one or two horses	10	..	..
The Machines to be tried at work, and brought to the Show-yard to remain during the Show.			
Plans or Models, with Specifications and Estimates of Labourers' Cottages, to be built in pairs, with not less than three sleeping rooms each, having regard to cheapness, arrangement, and convenience	20	10	..
Plans or Models, with Specifications and Estimates for hay or corn sheds, with special regard to economy and convenience	10	5	..
Plans or Models, with Specifications and Estimates of covered sheds for storing manure	5	3	..
In awarding the above prizes, space, economy, and durability, will be especially considered.			
Collection of Modern Dairy Utensils	5	3	..
Harness for a Pair of Horses for all agricultural purposes, with regard to cheapness, lightness, and durability. Prices to be attached	10	5	
Best Illustration of the principle of Shoeing, and of shoes for horses of all classes	10	5	3

*** Forms of Certificate for entry, as well as Prize-Sheets for the Manchester Meeting, containing the whole of the conditions and regulations, may be obtained at the Office of the Society, No. 12, Hanover Square, London, W.

DATES OF ENTRY.

Certificates for the entry of Implements for the Manchester Meeting must be forwarded to the Secretary of the Society, No. 12, Hanover Square, London (W.), by the 1st of May, and Certificates for the entry of Live Stock by the 1st of June. Certificates received after those respective dates will not be accepted, but returned to the persons by whom they have been sent.

The Prizes of the Royal Agricultural Society of England, and all Prizes offered by the Manchester Local Committee, are open to general competition.

Essays and Reports.

AWARDS FOR 1868.

Class I.

The Prize of 30*l.* was awarded to the Rev. J. C. Clutterbuck, of Long Whittenham, Abingdon, for his Essay on the Farming of Middlesex.

Class II.

The Prize of 20*l.* was awarded to Mr. Clement Cadle, of Gloucester, for his Essay on the Improvement of Grass Lands.

Class VII.

The Prize of 10*l.* was awarded to Mr. R. Vallentine, of Burcott Lodge, Leighton Buzzard, for his Essay on the Retention of Moisture in Arable Lands.

Class VIII.

The Prize of 15*l.* was awarded to Mr. R. L. Everett, of Rushmere, Ipswich, for his Essay on the Succession of Green Crops.

Class IX.

The Prize of 25*l.* was awarded to Mr. J. Tanner Davy, of Rose Ash, South Molton, Devon, for his Essay on the Devon Breed of Cattle.

Members' Privileges of Chemical Analysis.

The Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ-fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.—An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample)	5*s.*
„ 2.—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia	10*s.*
„ 3.—An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda	10*s.*
„ 4.—An analysis of superphosphate of lime for soluble phosphates only	10*s.*
„ 5.—An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia ..	£1.
„ 6.—An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure	£1.
„ 7.—Limestone:—the proportion of lime, 7*s.* 6*d.*; the proportion of magnesia, 10*s.*; the proportion of lime and magnesia	15*s.*
„ 8.—Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay ..	£1.
„ 9.—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	£1.
„ 10.—Complete analysis of a soil	£3.
„ 11.—An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate	£1.
„ 12.—Analyses of any vegetable product	£1.
„ 13.—Analyses of animal products, refuse substances used for manure, &c.	from 10*s.* to 30*s.*
„ 14.—Determination of the "hardness" of a sample of water before and after boiling	10*s.*
„ 15.—Analysis of water of land drainage, and of water used for irrigation	£2.
„ 16.—Determination of nitric acid in a sample of water	£1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. Augustus Voelcker, 11, Salisbury Square, London, E.C., to which he requests that all letters and parcels (postage and carriage paid) should be directed.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

ARTIFICIAL MANURES.—Take a large handful of the manure from three or four bags, mix the whole on a large sheet of paper, breaking down with the hand any lumps present, and fold up in tinfoil, or in oil silk, about 3 ozs. of the well-mixed sample, and send it to 11, SALISBURY SQUARE, FLEET STREET, E.C., by sample post: or place the mixed manure in a small wooden or tin box, which may be tied by string, but must not be sealed, and send it by sample post. If the manure be very wet and lumpy, a larger boxful, weighing from 12 to 15 ozs., should be sent either by sample post or railway.

Samples not exceeding 4 ozs. in weight may be sent by sample post, by attaching two penny postage stamps to the parcel.

Samples not exceeding 8 ozs., for 4 postage stamps.

Samples not exceeding 16 ozs., for 8 postage stamps.

Samples not exceeding 24 ozs., for 1*s.* in postage stamps.

There must be no writing or printing in the packet or its cover in addition to the address: DR. AUGUSTUS VOELCKER, 11, SALISBURY SQUARE, FLEET STREET, LONDON, E.C., and the address of the sender of the parcel, and the number or mark of the article sent.

These particulars must in all cases be given not on loose pieces of paper but on small labels attached to the samples or packages containing them.

The samples must be sent in covers, open at the ends or in boxes, bags of linen or other materials, which may be fastened by string, but must not be sealed, so as to be easily examined. No parcel sent by sample post must exceed 1½ lb. in weight, or 2 feet in length, or 1 foot in width or depth.

SOILS.—Have a wooden box made 6 inches long and wide, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil with its subsoil from 9 to 12 inches deep; trim this block or plan of the field to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid and send it by goods or parcel train to the laboratory. The soil will then be received in the exact position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

WATERS.—Two gallons of water are required for analysis. The water, if possible, should be sent in glass-stoppered Winchester half-gallon bottles, which are readily obtained in any chemist and druggist's shop. If Winchester bottles cannot be procured, the water may be sent in perfectly clean new stoneware spirit-jars surrounded by wickerwork. For the determination of the degree of hardness before and after boiling, only one quart wine-bottle full of water is required.

LIMESTONES, MARLS, IRONSTONES, AND OTHER MINERALS.—Whole pieces, weighing from 3 to 4 ozs., should be sent enclosed in small linen bags, or wrapped in paper. Postage, by sample post, 2*d.*, if under 4 ozs.

OILCAKES.—Take a sample from the middle of the cake. To this end break a whole cake into two. Then break off a piece from the end where the two halves were joined together, and wrap it in paper, leaving the ends open, and send parcel by sample post. The piece should weigh from 12 to 15 ozs.; postage, 8*d.* If sent by railway, one quarter or half a cake should be forwarded.

FEEDING MEALS.—About 3 ozs. will be sufficient for analysis. Enclose the meal in a small linen bag. Send it by sample post.

On forwarding samples, separate letters should be sent by post to the laboatory, specifying the nature of the information required, and, if possible, the object in view.

H. M. JENKINS, *Secretary.*

Members' Veterinary Privileges.

I.—Serious or Extensive Diseases.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that Professor Simonds, the Society's Veterinary Inspector, should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l.* 2*s.* each day as a professional fee, and 1*l.* 1*s.* each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—Ordinary or Other Cases of Disease.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l.* 2*s.* per diem, and travelling expenses.

III.—Consultations without visit.

Personal consultation with Veterinary Inspector	5*s.*
Consultation by letter	5*s.*
Consultation necessitating the writing of three or more letters.	10*s.*
Post-mortem examination, and report thereon	10*s.*

A return of the number of applications during each half-year being required from the Veterinary Inspector.

IV.—Admission of Diseased Animals to the Veterinary College; Investigations, Lectures, and Reports.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the same terms as if they were Members of the College; viz., by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Principal according to circumstances."

No. 2. The College has also undertaken to investigate such particular classes of disease, or special subjects connected with the application of the Veterinary art to cattle, sheep, and pigs, as may be directed by the Council.

No. 3. In addition to the increased number of lectures now given by Professor Simonds—the Lecturer on Cattle Pathology—to the pupils in the Royal Veterinary College, he will also deliver such lectures before the Members of the Society, at their house in Hanover Square, as the Council shall decide.

No. 4. The Royal Veterinary College will from time to time furnish to the Council a detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary.

Royal Agricultural Society of England.

1869–70.

President.

THE DUKE OF DEVONSHIRE, K.G.

Trustees.

Acland, Sir Thomas Dyke, Bart., *Killerton Park, Exeter, Devonshire.*
Berners, Lord, *Keythorpe Hall, Leicester.*
Bramston, Thomas William, *Skreens, Chelmsford, Essex.*
Challoner, Colonel, *Portnall Park, Staines, Middlesex.*
Chesham, Lord, *Latimer, Chesham, Bucks.*
Marlborough, Duke of, K.G., *Blenheim Park, Oxford.*
Portman, Lord, *Bryanston, Blandford, Dorset.*
Powis, Earl of, *Powis Castle, Welshpool, Montgomeryshire.*
Rutland, Duke of, K.G., *Belvoir Castle, Grantham, Leicestershire.*
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Thompson, Harry Stephen, *Kirby Hall, York.*
Tredegar, Lord, *Tredegar Park, Newport, Monmouthshire.*

Vice-Presidents.

Bridport, Viscount, *Cumberland Lodge, Windsor, Berkshire.*
Cathcart, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
Chichester, Earl of, *Stanmer Park, Lewes, Sussex.*
Devonshire, Duke of, K.G., *Holker Hall, Lancashire.*
Egmont, Earl of, *Cowdray Park, Petworth, Sussex.*
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Hill, Viscount, *Hawkstone Park, Salop.*
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Walsingham, Lord, *Merton Hall, Thetford, Norfolk.*

Other Members of Council.

Acland, Thomas Dyke, M.P., *Sprydoncote, Exeter, Devonshire.*
Amos, Charles Edwards, 5, *Cedars Road, Clapham Common, Surrey.*
Baldwin, John, *Luddington, Stratford-on-Avon, Warwickshire.*
Barnett, Charles, *Stratton Park, Biggleswade, Bedfordshire.*
Barthropp, Nathaniel George, *Hacheston, Wickham Market, Suffolk.*
Booth, Thomas Christopher, *Warlaby, Northallerton, Yorkshire.*
Bowly, Edward, *Siddington House, Cirencester.*
Cantrell, Charles S., *Riding Court, Datchet, Bucks.*
Clayden, John, *Littlebury, Saffron Walden, Essex.*

Clive, George, *Perrystone. Ross, Herefordshire.*
Davies, David Reynolds, *Mere Old Hall, Knutsford, Cheshire.*
Dent, J. D., M.P., *Ribston Hall, Wetherby, Yorkshire.*
Druce, Joseph, *Eynsham, Oxford.*
Edmonds, William John, *Southrop, Lechlade, Gloucestershire.*
Gibbs, B. T. Brandreth, *Halfmoon Street, Piccadilly, London,* W.
Hassall, William, *Bubney, Whitchurch, Salop.*
Hesketh, Sir Thomas, Bart., M.P., *Rufford Hall, Ormskirk.*
Holland, Edward, *Dumbleton Hall, Evesham, Gloucestershire.*
Hornsby, Richard, *Spittle Gate, Grantham, Lincolnshire.*
Hoskyns, Chandos Wren, M.P., *Harewood, Ross, Herefordshire.*
Hutton, William, *Gate Burton, Gainsboro', Lincolnshire.*
Kesteven, Lord, *Caswick, Stamford, Lincolnshire.*
Kingscote, Colonel, M.P., *Kingscote, Wootton-under-Edge, Gloucestershire.*
Lawes, John Bennet, *Rothamsted, St. Albans, Herts.*
Leeds, Robert, *Wicken Farm, Castleacre, Brandon, Norfolk.*
Lichfield, Earl of, *Shugborough, Staffordshire.*
Liddell, Hon. Henry George, M.P., *Ravensworth Castle, Durham.*
Lopes, Sir Massey, Bart., M.P., *Maristow, Roborough, Devon.*
Macdonald, Sir Archibald Keppel, Bart., *Woolmer Lodge, Liphook, Hants.*
Milward, Richard, *Thurgarton Priory, Southwell, Notts.*
Pain, Thomas, *Ugford Cottage, Salisbury, Wilts.*
Randell, Charles, *Chadbury, Evesham, Worcestershire.*
Ransome, Robert Charles, *Ipswich, Suffolk.*
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Sanday, William, *Holmepierrepont, Notts.*
Shuttleworth, Joseph, *Hartsholme Hall, Lincoln.*
Statter, Thomas, *Stand Hill, Whitefield, Manchester.*
Stone, N. Chamberlain, *Aylestone Hall, Leicester.*
Torr, William, *Aylesby Manor, Great Grimsby, Lincolnshire.*
Turner, George, *Brampford Speke, Exeter, Devonshire.*
Vane, Sir Henry Ralph, Bart., *Hutton Hall, Penrith, Cumberland.*
Vernon, Lord, *Sudbury Hall, Derby.*
Webb, James, *Spring Hill, Fladbury, Pershore, Worcestershire.*
Wells, William, M.P., *Holmewood, Peterborough, Northamptonshire.*
Western, Sir Thomas B., Bart., *Felix Hall, Kelvedon, Essex.*
Wilson, Major Fuller Maitland, *Stowlangtoft Hall, Bury St. Edmund's, Suffolk.*
Wilson, Jacob, *Woodhorn Manor, Morpeth, Northumberland.*
Wynn, Sir Watkin Williams, Bart, M.P., *Wynnstay, Rhuabon, Denbighshire.*

Secretary and Editor.

H. M. JENKINS, 12, *Hanover Square, London,* W.

Consulting Chemist—Dr. Augustus Voelcker, 11, *Salisbury Square,* E.C.
Veterinary Inspector—James Beart Simonds, *Royal Veterinary College,* N.W.
Consulting Engineer—James Easton, or C. E. Amos, *Grove, Southwark,* S.E.
Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.
Publisher—John Murray, 50, *Albemarle Street,* W.
Bankers—The London and Westminster Bank, *St. James's Square Branch,* S.W.

STANDING COMMITTEES FOR 1869.

Finance Committee.

Bridport, Viscount, Chairman.
Bramston, T. W.
Kingscote, Colonel, M.P.
Randell, Charles.
Torr, William.

House Committee.

The President.
Chairman of Finance Committee.
Chesham, Lord.
Bramston, T. W.
Challoner, Colonel.
Gibbs, B. T. Brandreth.
Torr, William.

Journal Committee.

Thompson, H. S., Chairman.
Cathcart, Earl, Vice-Chairman.
Speaker, The Rt. Hon. the.
Kerrison, Sir E. C., Bt.
Acland, T. Dyke, M.P.
Dent, J. D., M.P.
Holland, Ed.
Hoskyns, C. Wren, M.P.
Milward, Richard.
Wilson, Jacob.

Chemical Committee.

Wells, William, M.P., Chairman.
Cathcart, Earl.
Vernon, Lord.
Kerrison, Sir E. C., Bt.
Lopes, Sir Massey, Bt., M.P.
Vane, Sir H., Bt.
Acland, T. Dyke, M.P.
Davies, D. R.
Dent, J. D., M.P.
Holland, Ed.
Hoskyns, C. Wren, M.P.
Huxtable. Ven. Archdeacon.
Lawes, J. B.
Thompson, H. S.
Voelcker, Dr. A.
Wilson, Jacob.

Veterinary Committee.

Bridport, Viscount, Chairman.
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Vane, Sir H., Bt.
Challoner, Colonel.
Dent, J. D., M.P.
Gibbs, B. T. Brandreth.
Pain, Thos.
Simonds, Professor.
Spooner, Professor.
Varnell, Professor.
Wells, William, M.P.
Wilson, Jacob.

Stock-Prizes Committee.

Bridport, Viscount.
Chesham, Lord.
Kesteven, Lord.
Walsingham, Lord.
Liddell, Hon. H. G., M.P.
Baldwin, John.
Barnett, Charles.
Barthropp, Nathaniel G.
Booth, T. C.
Bowly, Edward.
Clayden, John.
Davies, D. R.
Dent, J. D., M.P.
Druce, Joseph.
Gibbs, B. T. Brandreth.
Hassall, Wm.
Holland, Ed.
Jonas, Samuel.
Milward, Richard.
Pain, Thomas.
Randell, Chas.
Rigden, Wm.
Sanday, Wm.
Torr, William.
Turner, George.
Webb, James.
Wilson, Jacob.
The Stewards of Live Stock.

Implement Committee.

Challoner, Col., Chairman.
Cathcart, Earl.
Bridport, Viscount.
Vernon, Lord.
Kerrison, Sir E. C., Bt.
Macdonald, Sir A. K., Bart.
Amos, C. E.
Cantrell, Chas. S.
Druce, Joseph.
Gibbs, B. T. Brandreth.
Holland, Ed.
Hornsby, Richard.
Hoskyns, C. Wren, M.P.
Randell, Charles.
Ransome, R. C.
Sanday, William.
Shuttleworth, Joseph.
Thompson, H. S.
Torr, William.
Wilson, Jacob.
The Stewards of Implements.

General Oxford Committee.

Marlborough, Duke of.
Richmond, Duke of.
Lichfield, Earl of.
Powis, Earl of.
Bridport, Viscount.
Chesham, Lord.
Kesteven, Lord.
Vernon, Lord.
Walsingham, Lord.
Liddell, Hon. G., M.P.
Hesketh, Sir T., Bt., M.P.
Lopes, Sir Massey, Bt., M.P.
Macdonald, Sir A. K., Bart.
Wynn, Sir Watkin W. Bt., M.P.
Amos, C. E.
Booth, Mr. T. C.
Bowly, Edward.
Cantrell, Charles S.
Clayden, John.
Davies, D. R.
Druce, Joseph.
Edmonds, W. J.
Gibbs, B. T. Brandreth.
Hornsby, Richard.
Hoskyns, C. Wren, M.P.
Kingscote, Col., M.P.
Middleton, Henry.
Milward, Richard.
Neate, Charles.
Newton, R. J.
Oxford, Mayor of.
Randell, Charles.
Ransome, R. C.
Sanday, William.
Shuttleworth, Joseph.
Statter, Thos.
Torr, William.
Webb, James.
Wells, William, M.P.
Wilson, Major.
Wilson, Jacob.
The Stewards.

Show-Yard Contracts Committee.

Randell, Charles, Chairman.
Cathcart, Earl.
Bridport, Viscount.
Vernon, Lord.
Amos, C. E.
Gibbs, B. T. Brandreth.
Hornsby, Richard.
Milward, Richard.
Sanday, William.
Shuttleworth, Joseph.
Thompson, H. S.
Torr, William.

Committee of Selection.

Thompson, H. S., Chairman.
Cathcart, Earl.
Powis, Earl of.
Bridport, Viscount.
Walsingham, Lord.
Speaker, Right Hon. the.
Clayden, John.
Dent, J. D., M.P.
Druce, Joseph.
Edmonds, W. J.
Holland, Ed.
Milward, R.
Randell, Charles.
Richmond, Duke of.
Torr, William.
Wells, William, M.P.

Education Committee.

Lichfield, Earl of.
Powis, Earl of.
Bridport, Viscount.
Acland, T. Dyke, M.P.
Dent, J. D., M.P.
Holland, Ed.
Hoskyns, C. Wren, M.P.
Kingscote, Col., M.P.
Wells, William., M.P.
Voelcker, Dr.

Cattle Plague Committee.

The whole Council.

*** The President, Trustees, and Vice-Presidents are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, Hanover Square, Wednesday, May 22, 1869.

REPORT OF THE COUNCIL.

Since the General Meeting in December, 4 Governors and 48 Members have died, the name of 1 Governor has been transferred to the list of Members, and the names of 212 Members have been removed from the list; 2 Governors and 194 Members have been elected, so that the Society now consists of

75 Life Governors,
73 Annual Governors,
1417 Life Members,
3864 Annual Members,
17 Honorary Members,

making a total of 5446, being a decrease of 15 names as compared with this time last year.

His Grace the Duke of Devonshire, K.G., has been elected a Vice-President in the room of the late Sir J. V. B. Johnstone, Bart., M.P; and Sir Thomas Hesketh, Bart., M.P., of Rufford Hall, Lancashire, and Thomas Statter, Esq., of Stand Hill, Whitefield, Manchester, have been elected Members of the Council to fill the vacancies caused by the resignation of Clare Sewell Read, Esq., M.P., and the election of His Grace the Duke of Richmond, K.G., as a Vice-President.

The half-yearly statement of accounts to the 31st December, 1868, has been examined and certified by the auditors and accountants of the Society. This statement has been published in the last number of the Journal, together with the Leicester Country Meeting account, and a balance-sheet for the whole year 1868.

The funded capital of the Society still remains 16,027*l.* 19*s.* 7*d.*, in the New Three per Cents., the sum of 3000*l.* lies on deposit

with the Society's bankers, and the cash balance in their hands on the 1st instant was 4235*l.*

His Highness the Pasha of Egypt has been unanimously elected an Honorary Member of the Society, in recognition of his generous aid to British Agriculture, and his interest in its progress.

His Excellency M. Drouyn de L'Huys and M. Edouard Lecouteux, the first President and Secretary of the 'Société des Agriculteurs de France,' have also been unanimously elected Honorary Members of the Society.

The Society resolved last year to hold its Country Meeting for 1870 at some town in the division comprising Berkshire, Buckinghamshire, Hampshire, Kent, Oxfordshire, Surrey, and Sussex. A memorial having been received from the Corporation of Oxford, and the arrangements made by the authorities appearing to meet the requirements of the Society, the Council have to announce that the Country Meeting for 1870 will be held at Oxford.

After inviting nominations from Members of the Society, and after correspondence with the principal county Agricultural Societies, new lists of Judges of Stock and of Implements have been prepared.

Memorials signed by several breeders of Oxfordshire, Shropshire, and Long-Woolled Sheep, requesting the Council to abolish the system of inspection, as well as all restrictions on the shearing of sheep, have been received. A full reply has been given to the statements in the memorials, and the Council have endeavoured to render inspection more thorough and efficient by appointing an additional inspector.

The Country Meeting to be held at Manchester, under the Presidency of His Royal Highness the Prince of Wales, K.G., from the 19th to the 24th of July, promises to be unusually attractive. The Society's Show-yards for Implements and Live Stock will contain upwards of sixty acres. The entries for Implements and Machinery, &c., which closed on the 1st instant, show that this department will be even more extensive than the large display of last year, and it may confidently be expected that the show of Live Stock will be on an equally large scale. A schedule of prizes to the amount of 4120*l.* has been issued for Live Stock and Implements.

The Local Committee have also announced their intention of holding a show of Hounds and an exhibition of leaping of Hunters; and the Royal Horticultural Society will hold a Flower-show adjacent to the Society's yard.

The Society already possesses in its Journal valuable Reports on the Agriculture of most of the English Counties. Several years, however, have elapsed since many of these Reports were written, and the Council feel sure that in the present more advanced state of Agricultural practice and science there is still much of interest to record in different localities. They have, therefore, thought it advisable to obtain more detailed information as to the management of particular districts, and for this purpose special farms have been selected, to which gentlemen deputed by the Council have recently paid visits. In the next number of the Journal it is intended that ample reports of these farms shall appear; and it is hoped that these reports will not only record anything peculiar in the system pursued upon the farms themselves, but will also contain much useful practical information and prove interesting to the general readers of the Journal.

The examinations for the Society's Educational Prizes and Certificates were held on the 13th of April and following days, when 18 candidates, out of 21 who had entered, presented themselves for examination in the several subjects. According to the scheme authorised by the Council, a candidate, in order to obtain a certificate, was required to satisfy the examiners in Practical Agriculture and in Book-keeping, as well as in one of the two following subjects, viz.: in Mechanics as applicable to Agriculture or in Land Surveying; and to enable him to take a place in the first class he was also required to pass in Chemistry. Candidates had also the option of offering themselves for examination in one or more of the following subjects, viz.: Botany, Geology, and Veterinary Science; and those who passed in any one or more of them had the marks thus obtained placed to their credit in the general classification.

In the examination of this year 200 marks were allotted to Agriculture, Mechanics, Chemistry, and Book-keeping respectively; and 100 each to Land-Surveying, Veterinary Science, Geology, and Botany; the pass number being one-half the number of marks allotted in the essential subjects.

Successful candidates have been placed in two classes, in each

of which they have been arranged in order of merit; and they have been rewarded as follows:—To each of those placed in either of the classes an appropriate certificate has been granted, specifying the subjects in which he has passed; the two candidates who have obtained first-class certificates have been made life members of the Society, and two prizes, of 30*l.* and 20*l.* respectively, have been awarded to them for aggregate merit. Prizes have been awarded to those candidates who showed the greatest knowledge of each individual subject of examination, irrespectively of his place in the general classification.

The result of the examinations this year has been most satisfactory, and has enabled the examiners, in conjunction with the Education Committee, to make the following classification and award of prizes:—

FIRST CLASS.

John J. Harle, Haydon Bridge C. G. Roberts, Hazlemere	Royal Agricultural College.

These gentlemen become Life Members of the Society, and, in addition, the former receives a prize of 30*l.* and the latter of 20*l.*

SECOND CLASS.

A. R. Wallis, India Edwin Fox, Finchley H. Rivington, Finsbury Square G. Skipworth, Caistor	Royal Agricultural College.
G. R. Glendinning, Mid Lothian,	Edinburgh University.
James Fowler, Durham G. Y. Wall, Durham L. W. Olive, Cheltenham	Royal Agricultural College.

It is to the Council a matter of congratulation that, with one exception, all the gentlemen who have obtained certificates intend to be either farmers or land agents.

The prizes offered to those candidates who should show the highest merit in each subject have been awarded as follows:—

In Agriculture	£10 to J. J. Harle.
Mechanics	£10 to C. J. Roberts.
Chemistry	£10 to H. Rivington.
Botany	£10 to H. Rivington.
Veterinary Science	£10 to A. R. Wallis.
Book-keeping	£5 to G. Y. Wall.
Land Surveying	£5 to Jas. Fowler.
Geology	£5 to H. Rivington.

MEMORANDA.

Address of Letters.—The Society's office being situated in the postal district designated by the letter W. members in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

General Meeting in London, in December, 1869.

General Meeting in London, May 22nd, 1870, at 12 o'clock.

Meeting at Oxford, in July, 1870.

Monthly Council (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

Adjournments.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

Diseases of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society; and of sending animals to the Royal Veterinary College, on the same terms as if they were subscribers to the College.—(A statement of these privileges will be found in the Appendix.

Chemical Analysis.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in the Appendix to the present volume.

Subscriptions.—1. Annual.—The subscription of a Governor is £5, and that of a Member £1, due in advance on the 1st of January of each year, and becoming in arrear if unpaid by the 1st of June. 2. For Life.—Governors may compound for subscription during future life by paying at once the sum of £50, and Members by paying £10.

Payments.—Subscriptions may be paid to the Secretary, in the most direct and satisfactory manner, either at the office of the Society, No. 12, Hanover Square, London, W., between the hours of ten and four, or by means of post-office orders, to be obtained at any of the principal post-offices throughout the kingdom, and made payable to him at the Vere Street Office, London, W.; but any cheque on a banker's or any other house of business in London will be equally available, if made payable on demand. In obtaining post-office orders care should be taken to give the postmaster the correct Christian name and surname (H. M. Jenkins) of the Secretary of the Society, otherwise the payment will be refused to him at the post-office on which such order has been obtained; and when remitting the money-orders it should be stated by whom, and on whose account, they are sent. Cheques should be made payable as drafts on demand (not as bills only payable after sight or a certain number of days after date), and should be drawn on a London (not on a local country) banker. When payment is made to the London and Westminster Bank, St. James's Square Branch, as the bankers of the Society, it will be desirable that the Secretary should be advised by letter of such payment, in order that the entry in the banker's book may be at once identified, and the amount posted to the credit of the proper party. No coin can be remitted by post.

New Members.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary.

Packets by Post.—Packets not exceeding two feet in length, width, or depth, consisting of written or printed matter (but not containing letters sealed or open) if sent without envelopes, or enclosed in envelopes open at each end, may be forwarded by the inland post, if stamped, at the following rates:—One Penny for every quarter of a pound or fraction of a quarter of a pound.

*** Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-laws, of a Statement of the General Objects, &c., of the Society, of Chemical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

DR. **HALF-YEARLY CASH ACCOUNT**

	£. s. d.			£. s. d.		
	£.	s.	d.	£.	s.	d.
To Balance in hand, 1st January, 1868:—						
Bankers	1,006	16	10			
Secretary	10	0	8			
				1,016	17	6
To Income:—						
Dividends on Stock	234	8	2			
Subscriptions:— (£. s. d.)						
Governors' Life-Compositions .. 100 0 0						
Governors' Annual 355 0 0						
Members' Life-Compositions .. 420 0 0						
Members' Annual 2,987 2 0						
	3,862	2	0			
Journal:—						
Advertisements	25	5	9			
				4,121	15	11
To Country Meetings:—						
Bury St. Edmund's	2	2	0			
Leicester	0	18	0			
Manchester	5,770	6	0			
				5,773	6	0
				£10,911	19	5

BALANCE-SHEET,

LIABILITIES.

	£.	s.	d.	£.	s.	d.
To Capital:—						
Surplus, 31st December, 1868	21,270	9	4			
Surplus of Income over Expenditure during the Half-year:— (£ s. d.)						
Income 4,123 17 11						
Expenditure 2,783 14 9						
	1,340	3	2			
	22,610	12	6			
To Leicester Meeting:—						
Difference between Receipts and Expenditure, the former exceeding the latter by	74	2	0			
				£22,536	10	6

QUILTER, BALL, & Co., *Accountants.*

FROM 1ST JANUARY TO 30TH JUNE, 1869. CR.

	£. s. d.	£. s. d.	£. s. d.
By Expenditure:—			
Establishment:—			
Official Salaries and Wages	444 18 0		
House Expenses, Rent, Taxes, &c.	638 18 1		
		1,083 16 1	
Journal:—			
Printing	413 4 6		
Postage and Delivery	119 4 0		
Stitching	72 0 7		
Prize Essays	75 0 0		
Other Contributions	95 18 0		
Editorship	100 0 0		
On account of visits to Farms ..	50 0 0		
		925 7 1	
Chemical:—			
Consulting Chemist's Salary ..	150 0 0		
Grant for Investigations	200 0 0		
		350 0 0	
Veterinary:—			
Grant to Royal Veterinary College (one year)		200 0 0	
Education		167 5 0	
Postage and Carriage		43 11 1	
Advertisements		8 15 6	
Subscriptions paid in error, returned		5 0 0	
			2,783 14 9
By Country Meetings:—			
Leicester		75 0 0	
Manchester		2,733 13 3	
			2,808 13 3
			5,592 8 0
By Deposit Account with London and Westminster Bank		3,000 0 0	
By Balance in hand, 30th June, 1869:—			
Bankers		2,297 5 8	
Secretary		22 5 9	
			5,319 11 5
			£10,911 19 5

30TH JUNE, 1869.

ASSETS.	£. s. d.	£. s. d.
By Cash in hand	2,319 11 5	
By Deposit account	3,000 0 0	
By New 3 per Cent. Stock 16,027*l.* 19*s.* 6*d.* cost* ..	15,379 15 7	
By Books and Furniture in Society's House	2,000 0 0	
By Country Meeting Plant	2,800 0 0	
		25,499 7 0
Less at Credit of Manchester Meeting		2,962 16 6
		£22,536 10 6

* *Value at* $92\frac{5}{8}$=£14,845 18*s.* 3*d.*

Mem.—The above Assets are exclusive of the amount recoverable in respect of arrears of Subscription to 30th June, 1869, which at that date amounted to 1,658*l.*

Examined, audited, and found correct, this 16th day of August, 1869.

A. H. JOHNSON,
HENRY CANTRELL,
FRANCIS SHERBORN,
} *Auditors on the part of the Society.*

SHOW AT MANCHESTER,

JULY, 1869.

STEWARDS OF THE YARD.

Stock.
William Wells, M.P.,
David Reynolds Davies,
Jacob Wilson.

Implements.
Sir E. C. Kerrison, Bart.
Sir A. K. Macdonald, Bart.
Major Wilson.

Forage.
David Reynolds Davies.

Honorary Director of the Show.
B. T. Brandreth Gibbs.

JUDGES OF STOCK.

Agricultural and Heavy Horses.
W. Jobson,
J. H. Wood,
J. H. Bland.

Thoroughbreds and Hunters.
W. Smith,
W. Young,
H. Thurnall.

Hackneys, Roadsters, Ponies, &c.
Hon. G. E. Lascelles,
Robert Leeds,
H. Beevor.

Shorthorn Males.
Marshall Stevenson,
T. Mace,
W. Bartholomew.

Shorthorn Females and Yorkshire Dairy Cross.
J. Unthank,
E. Bowly,
L. C. Crisp.

Herefords and other established Breeds.
T. Pymble,
G. Smythies,
J. R. Newton.

Devons and Channel Islands.
H. W. Keary,
R. Woodman,
J. Pitcher.

Scotch, Welsh, and Kerry.
T. Gibbons,
John Macmillan.

Leicesters.
G. Walmsley,
C. Clarke,
R. Fisher.

Cotswolds and Oxfordshire Downs.
R. Lord,
W. Parsons,
E. Ruck.

Lincolns and other Long-woolled.
H. Makinder,
J. H. Casswell.

Southdowns and Hampshire Downs.
H. Lugar,
T. Ellman,
W. Scott Hayward.

JUDGES OF STOCK—*continued.*

Shropshires.

John Woods,
H. Fookes,
W. H. Clare.

Lonk, Herdwick, Limestone, and Black-faced Scotch.

George Rea,
John Benn.

Cheviots and Border Leicesters.

F. P. Lynn,
A. Borthwick.

Pigs.

J. B. Slater,
S. Druce,
Thomas Trotter.

JUDGES OF BUTTER AND CHEESE.

R. Broady,
George Bowles,
J. Jennison,
Thomas Rigby.

Inspectors of Shearing.

H. Bone, W. B. Canning, Thomas Compton.

Veterinary-Inspectors.

Professor Simonds, Professor Varnell.

Assistant.—R. L. Hunt.

JUDGES OF IMPLEMENTS.

F. J. Bramwell, C.E.
(*Engineer Judge*).

Mowing and Haymaking Machines and Horse Rakes.

John Hemsley,
J. W. Kimber,
Matthew Savidge.

Reaping, Sheaf-Binding, and Corn-Drying Machines.

John Hicken,
W. Sanday,
W. Sadler.

Manure Distributors, Waggons, and Carts.

John Wheatley,
Henry Cantrell,
John Gibson.

Miscellaneous and Dairy Utensils.

H. B. Caldwell,
F. Sherborn,
J. K. Fowler.

Plans and Models.

J. Coleman,
J. Bailey Denton,
J. E. Watson.

AWARD OF PRIZES.

NOTE.—The Judges were instructed, besides awarding the Prizes, to designate as the *Reserve Number* one animal in each Class, next in order of merit, if it possessed sufficient for a Prize—in case an animal to which a Prize was awarded should subsequently become disqualified.

Special Prizes offered by the Manchester Local Committee are marked thus (*).

HORSES.

Agricultural Stallions foaled before the 1st *of January*, 1867.

WILLIAM WELCHER, Upwell, Wisbeach, Cambridgeshire: FIRST PRIZE, 25*l.*, for "Honest Tom," bay, 4 years-old; bred by exhibitor; sire, Mr. Tibbett's "Thumper;" dam, "Beauty;" sire of dam, Mr. Hammond's "Emperor."

WILLIAM WYNN, Cranwhite Leys, Grafton, Alcester, Redditch, Warwickshire: SECOND PRIZE, 15*l.*, for "A 1," dapple grey, 5 years-old; bred by R. Watts, Esq., Goddington Hall, Bucks; sire, "Great Britain;" sire of dam, "Brown Stout."

MICHAEL STRICKLAND, Headley Hall, Tadcaster, Yorkshire: THIRD PRIZE, 5*l.*, for "Lincolnshire," brown, 11 years-old; bred by Mr. G. Stap, Fishlake, Doncaster; sire, "Young Warwick;" sire of dam, "Plough Boy."

Agricultural Stallions—Two Years old.

JOSEPH FLINTHAM, Somersham, St. Ives, Hunts: FIRST PRIZE, 20*l.*, for "Black Prince," black; bred by exhibitor; sire, "Black Prince;" dam, "Diamond."

THOMAS SHAW, Maudsley, Ormskirk, Lancashire: SECOND PRIZE, 10*l.*, for "Columbus," bay; bred by R. Burnett, Esq., Holbeach, Lincolnshire; sire, "The Admiral;" sire of dam, Mr. Brown's "England's Glory."

RALPH LAYLAND, Martin Hall, Burscough, Ormskirk, Lancashire: THIRD PRIZE, 5*l.*, for "Napoleon;" brown, bred by exhibitor; sire, "Napoleon;" dam, "Star;" sire of dam, "Lord Raglan."

Clydesdale Stallions foaled before the 1st *of January*, 1867.

JAMES NICOL FLEMING, Knockdown, Maybole, Ayrshire: FIRST PRIZE, 25*l.*, for "Prince of Wales," brown, 3 years-old; bred by exhibitor; sire, "General;" dam, "Darling;" sire of dam, "Samson."

ROBERT ORANGE, of Bedlington, Northumberland: SECOND PRIZE, 15*l.*, for "Conqueror," grey, 3 years-old; bred by Mr. J. Libburn, Preston, North Shields; sire, "Young Glancer;" dam, "Beauty;" sire of dam, "Young Conqueror."

BRYAN G. DAVIES COOKE, of Colomendy, Mold, North Wales: THIRD PRIZE, 5*l.*, for "Sir Norman," bay, 3 years old; bred by Mr. Wylie, Whitburn, Lancashire; sire, "Samson;" dam, "Bell."

Clydesdale Stallions—Two Years old.

David Riddell, Kilhowie, Duntocher, Dumbartonshire: First Prize, 20*l.*, for his brown; breeder unknown.

Her Majesty the Queen, Windsor Castle: Second Prize, 10*l.*, for "Prince Arthur," bay; bred by Her Majesty; sire, "The Don;" dam, "Violet;" sire of dam, "Britain."

Suffolk Stallions foaled before the 1st *January*, 1867.

Charles Boby, Alton Hall, Stutton, Ipswich, Suffolk: First Prize, 25*l.*, for "Prince," chestnut, 3 years-old; bred by Mr. C. Frost, Wherstead, Ipswich; sire, "Conqueror;" dam, "Bragg."

William Bott, Priors, Broomfield, Chelmsford, Essex: Second Prize, 15*l.*, for "Young Champion," chestnut, 3 years-old; bred by exhibitor; sire, "Champion;" dam, "Diamond;" sire of dam, Mr. Taylor's "Young Honest Tom."

William Wilson, Baylham Hall, Ipswich: Third Prize, 5*l.*, for "Young Briton," red chestnut, 3 years-old; bred by Mr. Spall, Stonham, Suffolk; sire, "Briton;" sire of dam, Mr. Fayer's "Boxer."

Suffolk Stallions—Two Years old.

John Ward, East Mersea, Colchester, Essex: First Prize, 20*l.*, for his red chestnut; bred by Mr. L. Wrinch, Birch Hall, Kirby, Colchester; sire, Mr. Wolton's "Warrior."

Thoroughbred Stallions, suitable for getting Hunters.

The Earl of Zetland, Aske, Richmond, Yorkshire: First Prize, 100*l.*, for "Carbineer," bay, 11 years old; bred by exhibitor; sire, "Rifleman;" dam, "Comfit;" sire of dam, "Sweetmeat."

Joseph Casson, Burgh-by-Sands, Carlisle: Second Prize, 25*l.*, for "Motley," brown, 18 years-old; bred by Mr. Rickerby; sire, "Touchstone;" sire of dam, "Lanercost."

Charles and James Moffat, Kirklinton Park, Carlisle: Third Prize, 10*l.*, for "Laughing Stock," bay, 10 years-old; bred by Sir Charles Monks, Belsea Castle, Northumberland; sire, "Stockwell;" dam, "Gaiety;" sire of dam, "Touchstone."

Frederick Barlow, Hasketon, Woodbridge, Suffolk: the *Reserve Number*, to "Dalesman," chestnut, 6 years-old; bred by Baron Rothschild, Mentmore, Leighton-Buzzard; sire, "King Tom;" dam, "Agnes;" sire of dam, "Pantaloon."

Hackney Stallions.

Philip Triffitt, Holme-on-Spalding Moor, York: First Prize, 25*l.*, for "Fireaway," dark brown, 9 years-old; bred by exhibitor; sire, "Achilles;" dam, "Nancy;" sire of dam, "Performer."

Charles Beart, Stow, Downham Market, Norfolk: Second Prize, 15*l.*, for "Ambition," red roan, 6 years-old; bred by exhibitor; sire, Mr. Bultitaft's "Phenomenon;" dam, Baxter's "Performer."

Henry Bultitaft, Bedwellhay Grange, Ely, Cambridgeshire: Third Prize, 5*l.*, for "Clear the Way," roan, 6 years-old; bred by Mr. W. Phypers, Cottenham, Cambridge; sire, "Phenomenon;" sire of dam, "Hue and Cry Shales."

HENRY RICHARD HART, Dunnington Lodge, Dunnington, Yorkshire: the *Reserve Number*, to "All Fours," bay, 14 years-old; bred by exhibitor; sire, "Prickwillow;" dam, "Maid of All-work;" sire of dam, "Fire-away."

Coaching Stallions.

THOMAS AND JOHN REYNOLDS, Carlton, Selby, Yorkshire: FIRST PRIZE, 25*l*., for "Young Ebor," dark bay, 7 years-old; bred by exhibitors; sire, "Ebor; dam, "Smiler;" sire of dam, "Alma."

RICHARD COWARD, Cabus, Garstang, Lancashire: SECOND PRIZE, 15*l*., for "Octavion," dark bay, 3 years-old; bred by J. Poole, Esq., Hambledon, Poulton-le-Fylde, Lancashire; sire, "Titan;" dam "Bessy;" sire of dam, "Longwaist."

RICHARD C. NAYLOR, Kelmarsh Hall, Northampton: THIRD PRIZE, 5*l*., for "The Hadji," brown, 14 years-old; bred by Mr. J. Davidson; sire, "Faugh-a-Ballagh;" dam, "Athol Brose;" sire of dam, "Orlando."

JOHN ROWELL, Ramsey, Hunts: the *Reserve Number*, to "The Gentleman," chestnut, 4 years-old; bred by exhibitor; sire, "Quicksilver;" dam, "Black Bess;" sire of dam, "Huntingdonshire Phenomenon."

Pony Stallions under 14 *hands* 2 *inches.*

CAPTAIN HENRY PLATT, Bryn-y-Nenadd, Llanfairfechan, Carnarvonshire: FIRST PRIZE, 20*l*., for "Tom Sayers," dark brown, 12 years-old; bred by Mrs. Ellem, Cold Beck, Kirklinton, Cumberland; sire, "Hima Laddie;" sire of dam, "Lingcropper."

JOHN ANDREW DOYLE, Plas-dulas, Abergele, Denbighshire: SECOND PRIZE, 10*l*., for "Tramp," bay, 5 years-old; bred by exhibitor; sire, "Young Bartam;" dam, "Gipsy."

WILLIAM HAYWARD, Pen-Bryn, Carnarvon: the *Reserve Number*, to his brown 2 years-old; bred by exhibitor; sire, "Tom Sayers."

Mares in foal, or with foal at foot, for breeding Hunters.

JOHN BROWN, Wiggonby, Wigton, Cumberland: FIRST PRIZE, 25*l*., for "Sally," (and foal) bay, 19 years-old; bred by Mr. Chambers, Pelutho, Abbey Town, Cumberland; sire, "Galeor."

THOMAS FOX, Avenham Hall, Singleton, Kirkham, Lancashire: SECOND PRIZE, 15*l*., for "Pink" (and foal), chestnut, 7 years-old; bred by exhibitor; sire, "Sharston;" dam, "Rose;" sire of dam, "Octavian."

FREDERICK BARLOW, Hasketon, Woodbridge, Suffolk: THIRD PRIZE, 5*l*., for "Silverlocks" (and foal), brown, 14 years-old; bred by exhibitor; sire, "Robinson;" dam, "Gipsy;" sire of dam, "Warrior."

JOHN FIELDEN, Dobroyd Castle, Todmorden, Lancashire: the *Reserve Number*, to "Becky Sharp" (and foal), chestnut, aged; breeder unknown; sire, "Sharston; sire of dam, "Lord Collingwood."

**Hunter Mares or Geldings over Four Years old.*

FREDERICK BARLOW, Hasketon, Woodbridge, Suffolk: FIRST PRIZE, 30*l*., for "Top Stoll," brown gelding, 9 years-old; bred by Mr. Corbet, Elsborn, Brigg, Lincolnshire; sire, "Cornerstone;" sire of dam, "Rocket."

MAJOR GUNTER, King's Dragoon Guards, Manchester: SECOND PRIZE, 15*l*., for "Wetherby," bay gelding, 7 years-old; bred by Mr. Maynard; sire, "Lord Fauconberg;" sire of dam, "Idle Boy."

John W. T. Fylder, Hefferton, Wareham, Dorset: the *Reserve Number*, to "Tyrconnell," bay gelding, 7 years-old; breeder unknown; sire, "Anglesea;" sire of dam, "Slinge."

Hunter Geldings—Four Years old.

Sir George Cholmley, Bart., Howsham, York: First Prize, 20*l.*, and the Special Prize of 30*l.* for the best hunter in any of the classes, for "Don Juan," chestnut; bred by the exhibitor; sire, "Angelus;" dam, "Jetty;" sire of dam, "King Caradoc."

Thomas Heath Foden, Givendale Grange, Ripon, Yorkshire: Second Prize, 10*l.*, for "Young Artillery," bay; bred by Mr. Beggs; sire, "Artillery;" sire of dam, "Old Derby."

H. J. Percy, Howsenrigg, Aspatria, Cumberland: the *Reserve Number*, to "Thunder and Turf," bay; breeder unknown; sire, "Thunderbolt;" sire of dam, "Young Freeney."

Hunter Mares—Four Years old.

Jonathan Peel, Knowlmere Manor, Clitheroe, Yorkshire: First Prize, 20*l.*, for "Jessica," bay; bred by exhibitor; sire, "King of Trumps;" dam, "Jessie."

James Wilson, Crosthwaite, Milnthorpe, Westmorland: Second Prize, 10*l.*, for his brown; bred by exhibitor; sire, "Ghillie Callum;" sire of dam, "Old Longwaist."

Hunter Mares or Geldings—Three Years old.

Thomas Charles Thompson, Kirkhouse, Brampton, Cumberland: First Prize, 15*l.*, for "Byron," brown gelding; bred by exhibitor; sire, "Clansman;" sire of dam, "Galanthus."

Edward Murray, Newby, Carlisle, Cumberland: Second Prize, 10*l.*, for "Tibby," bay mare; bred by exhibitor; sire, "Laughing-Stock;" dam, "Old Tibby;" sire of dam, "Vol au Vent."

Thomas Newton, Oldfield, Altrincham, Cheshire: the *Reserve Number* to his chestnut gelding; bred by Colonel Towneley, Burnley; sire, "Hubert;" sire of dam, "Newminster."

Hunter Mares or Geldings, not less than Four Years old.

John B. Booth, Killerby Hall, Catterick, Yorkshire: First Prize, 20*l.*, for "Brian Boru," chestnut gelding, 6 years-old; breeder unknown; sire, "Chieftain;" sire of dam, "Dr. O'Toole."

James Paterson, Terrona, Langholm, Dumfriesshire: Second Prize, 10*l.*, for "Terrona," brown gelding, 5 years-old; bred by exhibitor; sire, "British Yeoman;" dam, "Mira;" sire of dam, "Giraffe."

William Murray, Broughton Mews, Manchester: the *Reserve Number*, to "Hotspur," dark bay gelding, 6 years-old; breeder unknown; sire, "Hotspur;" dam, "Little Known;" sire of dam, "Rocket."

Hackney Mares.

Francis Cook, Thixendale, York: First Prize, 20*l.*, for "British Queen" (and foal), bay, 11 years-old; bred by exhibitor; sire, "British Champion;" dam, "Evening Star;" sire of dam, "Wildfire."

HENRY NEILD, The Grange, Worsley, Manchester: SECOND PRIZE, 10*l.*, for "Stella" (in foal), bay, 10 years-old; breeder unknown.

JOHN JOSEPH FILDES, 126, Plymouth Grove, Manchester: THIRD PRIZE, 5*l.*, for "Peggy" (and foal), bay, about 8 years-old; breeder unknown.

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: the *Reserve Number*, to "Fanny" (and foal), brown, 4 years-old; bred by exhibitor; sire, "Pride of England."

**Pairs of Carriage Horses (Mares or Geldings).*

THOMAS MARK, Durdar House, Carlisle, Cumberland: FIRST PRIZE, 20*l.*, for "Jim," bay gelding, 4 years-old; sire, "Laughing-Stock;" "Dick," bay gelding, 6 years-old; sire, "Strychnine;" both bred by exhibitor.

**Brougham Horses (Mares or Geldings).*

JONATHAN PEEL, Knowlmere Manor, Clitheroe, Yorkshire: SECOND PRIZE, 5*l.*, for "Lady Mary," bay mare, 9 years-old; bred by exhibitor; sire, "President;" dam, "Jesse."

**Carriage Horses (Geldings or Fillies) foaled in* 1866.

WILLIAM and FREDERICK COULSON, Gaterley Farm, Castle Howard, Yorkshire: FIRST PRIZE, 10*l.*, for their bay gelding, 3 years-old; bred by J. W. Coulson, Slingsby, Yorkshire; sire, "Sir Strathern;" sire of dam, "Inkermann Hero."

LEONARD MANSFIELD, Thickleby-Barugh, Thirsk, Yorkshire: SECOND PRIZE, 5*l.*, for his bay gelding, 3 years-old; bred by exhibitor; sire, "Cairn;" dam, "Depper;" sire of dam, "Luck's-All."

**Roadster Mares or Geldings Four Years old and upwards.*

H. J. PERCY, Howsenrigg, Aspatria, Cumberland: FIRST PRIZE, 15*l.*, for "Crafty," brown mare, 11 years-old; bred by Mrs. Dalzell, Stainburn Hall, Workington; sire, "The Judge;" dam, "Old Crafty;" sire of dam, "Nimrod."

CHARLES LEIGH CLARE, Hopefield, Park Lane, Higher Broughton, Manchester: SECOND PRIZE, 10*l.*, for "Ginger," chestnut gelding, aged; breeder unknown.

WILLIAM MURRAY, Broughton Mews, Manchester: the *Reserve Number*, to "Perfection," dark chestnut gelding, 6 years-old; breeder unknown.

**Roadster Mares or Geldings above Four Years old.*

ARCHIBALD TURNER, Narborough Road, Leicester: FIRST PRIZE, 15*l.*, for his bay gelding, 8 years-old; bred by Mr. A. Hack, Buckminster, Grantham; sire, "The Prior."

EMILE PREST, Gorse Hill Farm, Stretford, Manchester: SECOND PRIZE, 10*l.*, for "Rufus," chestnut gelding, 7 years-old; breeder unknown; sire, "Serenader."

JOSEPH CASSON, Burgh-by-Sands, Carlisle, Cumberland: the *Reserve Number*, to his blue roan mare, 6 years-old; breeder unknown; sire, "Augur."

Pony Mares not exceeding 14 *hands.*

WILLIAM SIMPKIN, Burton-Agnes, Yorkshire: FIRST PRIZE, 15*l.*, for "Maid of Allwork;" bay, 6 years-old; bred by Mr. Jud, Hauthorpe, Burton-Agnes; sire, "Tom Thumb;" sire of dam, "Pride of England."

WILLIAM MURRAY, Broughton Mews, Manchester, SECOND PRIZE, 10*l.*, for "Hill Town Lass;" bay, 7 years-old; breeder unknown; sire, "Marquis."

JOSEPH WHITWORTH, Stancliffe Hall, Matlock Bath, Derbyshire: THIRD PRIZE, 5*l.*, for "Minnie;" brown, 6 years-old; bred by exhibitor; sire, "Black Hawke;" dam, "Jenny."

WILLIAM TORR, Aylesby Manor, Grimsby, Lincolnshire: the *Reserve Number*, to his grey, about 8 years-old; bred by exhibitor; sire of dam, "Rory O' Moore."

**Pony Mares or Geldings not exceeding* 13 *hands* 2 *inches.*

THOMAS HORROCKS MILLER, Preston, Lancashire: FIRST PRIZE, 10*l.*, for "Paddy," grey gelding, 9 years-old; breeder unknown.

THOMAS HOWDLE, 29, Silver Street, Hull, Yorkshire: SECOND PRIZE, 5*l.*, for "Tommy," bay gelding, 5 years-old; breeder unknown.

MRS. LEVITA, The Home, Whalley Range, Manchester, the *Reserve Number*, to "Taffie," grey gelding, aged; breeder unknown.

Agricultural Mares and Foals.

JOHN HENDERSON, Horsley Hill, South Shields, Co. Durham: FIRST PRIZE, 20*l.*, for "Jessey;" bay, 9 years-old; bred by exhibitor; dam, "Damsel;" sire of dam, "Farmer's Glory."

WILLIAM N. HODGSON, M.P., Newby Grange, Carlisle, Cumberland: SECOND PRIZE, 10*l.*, for his bay, 11 years-old; bred by Mr. Thomlinson, Warwick, Carlisle; sire, "Blythe."

THOMAS STATTER, jun., Stand Hill, Whitefield, Manchester: THIRD PRIZE, 5*l.*, for "Diamond," chestnut, 10 years-old; breeder unknown.

Clydesdale Mares and Foals.

SIR W. STIRLING MAXWELL, BART., Keir, Dunblane, Perthshire: FIRST PRIZE, 20*l.*, for "Jess," bay, 7 years-old; bred by Mr. T. Buchanan, Coldroch, Drymen, N.B.; sire, "Sir Walter Scott; sire of dam, "King William."

LAWRENCE DREW, Merryton, Hamilton, Lanarkshire: SECOND PRIZE, 10*l.*, for his bay 5 years-old; bred by Mr. A. Pollock, Muirhouse, Eaglesham, N.B.

**Cleveland Brood Mares.*

WILLIAM and FREDERICK COULSON, Gaterley Farm, Castle Howard, Yorkshire: FIRST PRIZE, 15*l.*, for "Venus," bay, 12 years-old; bred by exhibitors; sire, "Aristocrat;" sire of dam, "Greylock."

WILLIAM BEATTIE, Blennerhasset, Aspatria, Cumberland: SECOND PRIZE, 10*l.*, for "Damsel," bay, 16 years-old; bred by Mr. J. Sharp, Blennerhasset; sire, "Brilliant;" dam, "Blossom;" sire of dam, "Remembrance."

Agricultural Fillies—Three Years old.

HENRY NEILD, The Grange, Worsley, Lancashire: FIRST PRIZE, 15*l.*, for "Polly;" bay, bred by exhibitor; sire, Mr. Robinson's "True Briton;" dam, "Bonny;" sire of dam, "Cheshire Hero."

JOHN RIGBY, Little Leigh, Northwich, Cheshire: SECOND PRIZE, 10*l.*, for "Bess," dark grey; bred by exhibitor; sire, "Garibaldi;" dam, "Cumberland Betsie."

Clydesdale Fillies—Three Years old.

RICHARD WAUGH, Seathill, Irthington, Carlisle, Cumberland: FIRST PRIZE, 15*l.*, "Isabel," bay; bred by exhibitor; sire, "Champion;" dam, "Nancy;" sire of dam, "Byron."

LAWRENCE DREW, Merryton, Hamilton, Lanarkshire: SECOND PRIZE, 10*l.*, for his bay; breeder unknown.

Suffolk Fillies—Three Years old.

ALFRED NOBLE, Brazier's Hall, Creeting St. Peter, Needham-Market, Suffolk, FIRST PRIZE, 15*l.*, for "Duchess," chestnut; bred by exhibitor; sire: Boby's "Conqueror;" dam, "Dapper;" sire of dam, Barthropp's "Newcastle Captain."

Agricultural Fillies—Two Years old.

CHARLESLISTER, Coleby Lodge, Lincoln: FIRST PRIZE, 15*l.*, for his bay; bred by exhibitor; sire, "Champion;" dam, "Diamond."

REES, W. BRIDGWATER: Great Porthamel, Talgarth, Brecon: SECOND PRIZE, 10*l.*; for "Black Princess;" black; bred by exhibitor; sire, "Bumpre;" dam, "Bunting;" sire of dam, "Young Farmer."

Clydesdale Fillies—Two Years old.

JOHN CUNNINGHAM, White Cairn, Dalbeattie, Kirkcudbrightshire: FIRST PRIZE, 15*l.*, for his bay; bred by exhibitor; sire, "Merry Tom;" dam, "Kate."

LAWRENCE DREW, Merryton, Hamilton, Lanarkshire; SECOND PRIZE, 10*l.*, for his bay; bred by exhibitor.

Suffolk Fillies—Two Years old.

WILLIAM WILSON, Baylham Hall, Ipswich, Suffolk: FIRST PRIZE, 15*l.*, for his chestnut; bred by Mr. Sawyer, Tunstall, Wickham-Market; sire, Mr. Crisp's "May Duke;" sire of dam, Mr. Catlin's "Duke."

**Pairs of Heavy Dray Horses (Mares or Geldings).*

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: FIRST PRIZE, 25*l.*, for his "Punch," grey gelding, 9 years-old; breeder unknown: "Lily," roan gelding, 9 years-old; breeder unknown.

CHARLES W. BRIERLEY, Rhodes House, Middleton, Lancashire: SECOND PRIZE, 15*l.*, for "Thumper" and "Prince of Wales," geldings; ages and breeders unknown.

**Pairs of Horses (Mares or Geldings) suitable for Brewers' Drays.*

J. CRASHAW and J. BLAKELEY, the Collieries, Dewsbury, Yorkshire; FIRST PRIZE, 25*l.*, for their "Punch" and "Toby," chestnut geldings, 7 years-old; breeders unknown.

ARTHUR STEWART, Saint Bridge House, Gloucester: SECOND PRIZE, 15*l.*, for his "Blucher," chestnut gelding, 5 years-old; bred by exhibitor; sire, "King of the Valley:" "Colonel;" chestnut gelding, 3 years-old; bred by Mr. C. Priday, Longford, Gloucester, sire, "King of the Valley."

**Pairs of Dray Horses (Mares or Geldings) of the Heavy Breed.*

CHARLES W. BRIERLEY, Rhodes House, Middleton, Lancashire: FIRST PRIZE, 10*l.*, for "Prince of Wales," gelding, 8 years-old; breeder unknown.

WALTER CARTER, 7, Marsden Square, Manchester: SECOND PRIZE, 5*l.*, for his brown gelding, 6 years-old; breeder unknown.

**Pairs of Horses (Mares or Geldings) for Agricultural Purposes.*

THOMAS STATTER, Jun., Stand Hall, Whitefield, Manchester: FIRST PRIZE, 20*l.*, for "Jet," and "Maggie," black mares, 7 years-old; breeders unknown.

EARL GROSVENOR, M.P., Calveley Hall, Tarporley, Cheshire: SECOND PRIZE, 10*l.*, for "Gilpin," blue roan gelding, 9 years-old; bred by Mr. Whalley, Tilston, Tarporley: "Briton," blue roan gelding, 9 years-old; bred by Mr. Wade, Utkinton, Tarporley.

**Horse (Mare or Gelding) for Agricultural Purposes.*

LAWRENCE DREW, Merryton, Hamilton, Lanarkshire: FIRST PRIZE, 10*l.*, for "London Maggie No. 2," bay, 4 years-old; bred by exhibitor; sire, "Sir Walter;" dam, "London Maggie."

CHARLES W. BRIERLEY of Rhodes House, Middleton, Lancashire: SECOND PRIZE, 5*l.*, for "Sensation," mare, 4 years-old; breeder unknown.

CATTLE.

Shorthorns—Bulls above Three Years old.

SAMUEL WILEY, Brandsby, York: FIRST PRIZE, 40*l.*, for "Earl of Derby" (21,638), roan, 5 years 10 months 3 weeks 3 days-old; bred by exhibitor; sire, "Forerunner" (12,891); dam, "Blink Bonny;" sire of dam, "Grey Friar" (9172).

CHARLES R. SAUNDERS of Nunwick Hall, Penrith, Cumberland: FIRST PRIZE, 20*l.*, for "Edgar" (19,680), roan, 6 years 6 months 1 week 2 days-old; bred by the late R. W. Saunders, Nunwick Hall; sire, "Prince Patrick" (18,633); dam, "Young Emma;" sire of dam, "McTurk" (14,872).

GEORGE ROBERTSON BARCLAY, Keavil Hall, Dunfermline, Fifeshire: THIRD PRIZE, 10*l.*, for "Heir of Englishman" (24,122), roan, 4 years 2 months 2 weeks 2 days-old; bred by exhibitor; sire, "Englishman" (19,701); dam, "Seraphina 13th;" sire of dam, "John O'Gaunt" (16,322).

WILLIAM HOSKEN & SON, Loggan's Mill, Hayle, Cornwall: the *Reserve Number*, to "Prince Frederick 2nd" (24,806), light roan, 3 years 9 months 3 weeks 2 days-old; bred by exhibtor; sire, "Prince Frederick" (16,734); dam, "Maid of Athens;" sire of dam, "Sir Richard" (15,298).

Shorthorns—Bulls above Two and not exceeding Three Years old.

CHARLES W BRIERLEY, Rhodes House, Middleton, Lancashire: FIRST PRIZE, 25*l.*, for "Bolivar," roan, 2 years 2 months 3 weeks 6 days-old; bred by Mr. J. Meadows, Thornville, Wexford; sire, "First Fiddle" (19,749); dam, "Blossom 5th;" sire of dam, "Duke of Bedford" (11,378).

JOSEPH MEADOWS, Thornville, Wexford: SECOND PRIZE, 15*l.*, for "Charlie," red, 2 years 1 month 3 weeks 6 days-old; bred by exhibitor; sire, "First Fiddle;" dam, "Chintz;" sire of dam, "Fugleman" (14,580).

LORD SUDELEY, Toddington, Winchcombe, Gloucestershire: THIRD PRIZE, 5*l.*, for "Mandarin," white, 2 years 4 weeks 2 days-old; bred by exhibitor;

sire, "2nd Duke of Wetherby" (21,618); dam, "Seraphina 15th;" sire of dam, "John O'Gaunt" (16,322).

Robert Harrett, Kirkwhelpington, Newcastle-on-Tyne: the *Reserve Number*, to "Lord Henry," white, 2 years 1 month 2 weeks 3 days-old; bred by exhibitor; sire, "Stanwick" (22,965); dam, "Queen of Yetholm;" sire of dam, "Gipsy Prince" (17,965).

Shorthorns—Yearling Bulls above One and not exceeding Two Years old.

G. Savile Foljambe, Osberton Hall, Worksop, Notts: First Prize, 25*l*, for "Knight of the Bath," roan, 1 year 8 months 1 week 2 days-old; bred by exhibitor; sire, "Knight of the Garter" (22,062); dam, "May Fly;" sire of dam, "Imperial Windsor" (18,086).

Francis Hawkesworth Fawkes, Farnley Hall, Otley, Yorkshire: Second Prize, 15*l*., for "Lord Beaumont," roan, 1 year 9 months 2 weeks-old; bred by exhibitor; sire, "Lord Cobham" (20,164); dam, "Beauty;" sire of dam, "General Bosquet (14,591).

G. Savile Foljambe, Osberton Hall, Worksop: Third Prize, 5*l*., for "Knight of the Whistle," roan, 1 year 10 months 3 weeks 2 days-old; bred by exhibitor; sire, "Knight of the Garter (22,062); dam, "Blanche;" sire of dam, "Monarch" (13,347).

Colonel Charles Towneley, Towneley, Burnley, Lancashire: the *Reserve Number*, to "Baron Hubback," red, 1 year 3 months 1 week-old; bred by exhibitor; sire, "Baron Oxford" (23,375); dam, "Duchess 7th;" sire, of dam, "Grand Duke of Lancaster" (19,883).

Shorthorns—Bull Calves above Six and not exceeding Twelve Months old.

Francis Hawkesworth Fawkes, Farnley Hall, Otley, Yorkshire: First Prize, 10*l*., for "Lord Is-a-beau," white, 9 months 1 week 3 days-old; bred by exhibitor; sire, "Lord Cobham" (20,164); dam, "Isabella;" sire of dam, "Royal Oak" (16,873).

Colonel Charles Towneley, Towneley, Burnley, Lancashire: Second Prize, 5*l*., for "Baron Clollinge," red, 7 months 2 weeks-old; bred by exhibitor; sire, "Baron Oxford" (23,375); dam, "Lady Butterfly 2nd;" sire of dam, "6th Duke of Airdrie" (19,602).

Thomas Christopher Booth, Warlaby, Northallerton, Yorkshire: the *Reserve Number*, to "Royal Broughton," roan, 11 months 3 weeks 5 days-old; bred by exhibitor; sire, "Commander-in-Chief" (21,451); dam, "Lady Mirth;" sire of dam, "Sir Samuel" (15,302).

Shorthorns—Cows above Three Years old.

Thomas Christopher Booth, Warlaby, Northallerton, Yorkshire: First Prize, 20*l*., for "Lady Fragrant," roan, in-calf and in-milk, 6 years 1 month 3 days-old; bred by the late Richard Booth; sire, "Lord of the Valley" (14,837); dam, "Lady Blithe;" sire of dam, "Windsor" (14,013).

Emily Lady Pigot, Branches Park, Newmarket, Cambridgeshire: Second Prize, 10*l*., for "The Queene of Rosalea," roan, in-calf, 4 years 11 months 3 weeks 5 days-old; bred by exhibitor; sire, Ravenspur (20,628); dam, "White Ladye;" sire of dam, "Valasco" (15,443).

Captain Robert Tennant, Scarcroft Lodge, Shadwell, Leeds, Yorkshire: Third Prize, 5*l*., for "Miss Farewell," red and white, in-milk, 5 years 3 months 2 weeks old; bred by Colonel Towneley; sire, "Duke of

Wharfdale;" dam, "Frederick's Farewell;" sire of dam, "Grand Duke of Wetherby."

William Hosken & Son, Loggan's Mill, Hayle, Cornwall: the *Reserve Number*, to "Rosebud," light roan, in-calf; 4 years 3 months 4 weeks 1 day old; bred by exhibitor; sire, "Prince Frederick" (16,734); dam, "Kitchen Maid;" sire of dam, "Sir Richard" (15,298).

Heifers, in-milk or in-calf, not exceeding Three Years old.

Thomas Christopher Booth, Warlaby, Northallerton, Yorkshire: First Prize, 15*l.*, for "Patricia," roan, in-calf, 2 year 3 months 2 weeks-old; bred by exhibitor; sire, "Lord Blithe" (22,126); dam, "Alfreda;" sire of dam, "Prince Alfred" (13,494).

John Lynn, Church Farm, Stroxton, Grantham, Lincolnshire: Second Prize, 10*l.*, for "Queen of Diamonds," red and white, in-calf, 2 years 4 months 1 week-old; bred by exhibitor; sire, "Prizeman" (24,870); dam, "Queen of Hearts;" sire of dam, "May Duke" (13,320).

James How, Broughton, Huntingdon: Third Prize, 5*l.*, for "Lady Anne," red and white, in-calf, 2 years 10 months 2 weeks 2 days-old; bred by Mr. J. Logan, of Maindee House, Newport, Monmouthshire; sire, "Prince of the Empire" (25,578); dam, "Ladye Elinor;" sire of dam, "Sir Roger" (16,991).

The Rev. Leonard C. Wood, Singleton Lodge, Kirkham, Lancashire: the *Reserve Number*, to "Miranda 10th," white, in-calf, 2 years 5 months 3 days-old; bred by exhibitor; sire, "Prince of the Harem" (22,626); dam, "Miranda 9th;" sire of dam, "Prince George" (20,545).

Yearling Heifers above One and not exceeding Two Years old.

Colonel Charles Towneley, Towneley, Burnley: First Prize, 15*l.*, for "Baron Oxford's Beauty," roan, 1 year 3 months 3 weeks 2 days-old; bred by exhibitor; sire, "Baron Oxford" (23,375); dam, "British Beauty;" sire of dam, "British Prince" (14,197).

William Torr, Aylesby Manor, Grimsby, Lincolnshire: Second Prize, 5*l.*, for "Cherry Queen IVth.," red, 1 year 9 months 2 weeks 2 days-old; bred by exhibitor; sire, "Royal Bridegroom" (25,003); dam, "Cherry Queen;" sire of dam, "Killerby Monk" (20,053).

Richard Eastwood, Thorney Holme, Clitheroe, Yorkshire: Third Prize, 5*l.*, for "Double Butterfly 2nd," roan, 1 year 9 months 3 days-old; bred by exhibitor; sire, "The Hero" (20,958); dam, "Double Butterfly;" sire of dam, "Royal Butterfly" (16,862).

Richard Stratton, Burderop, Swindon, Wilts: the *Reserve Number*, to "Ariel," rich roan, 1 year 9 months 2 weeks 4 days-old; bred by exhibitor; sire, "Bude Light;" dam, "Miranda;" sire of dam, "Knight of the Lagan" (20,082).

Shorthorns—Heifer Calves, above Six Months, and under Twelve Months old.

Richard Stratton, Burderop, Swindon, Wilts: First Prize, 10*l.*, for "Flower Girl," rich roan, 8 months 1 week 4 days-old; bred by exhibitor; sire, "James 1st;" dam, "April Rose;" sire of dam, "Warwick" (19,120).

Richard Eastwood, Thorney Holme, Clitheroe, Yorkshire: Second Prize, 5*l.*, for "Red Butterfly," red, 11 months 3 weeks-old; bred by exhibitor;

sire, "Baron Oxford" (23,375); dam, "Phœbe Butterfly;" sire of dam, "Duke of Wharfdale" (19,648).

RICHARD STRATTON, Burderop, Swindon, Wilts: the *Reserve Number*, to "Gertrude," rich roan, 11 months-old; bred by exhibitor; sire, "James 1st;" dam, "Miss Glanville;" sire of dam, "Buckingham."

Herefords—Bulls above Three Years old.

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: FIRST PRIZE, 25*l.*, for "Sir Hungerford," red, white face, 3 years 10 months 1 week-old; bred by exhibitor; sire, "Dan. O'Connell" (1952); dam, "Nutty;" sire of dam, "Mortimer" (1328).

THE HON. THOMAS HENRY NOEL HILL, Berrington, Shrewsbury: SECOND PRIZE, 15*l.*, for "Young Conqueror," red, white face, 3 years 9 months 2 weeks 2 days-old; bred by exhibitor; sire, "Conqueror" (1929); dam, "Polyanthus;" sire of dam, "Albert Edward" (859).

PETER ROTHWELL JACKSON, Blackbrooke, Skinfrith, Monmouthshire, the *Reserve Number*, to "Blackbrooke," red, white face, 4 years 7 months 4 weeks 1 day-old; bred by exhibitor; sire, "Florence;" dam, "Silver;" sire of dam, "Treasurer" (1505).

Herefords—Bulls above Two and not exceeding Three Years old.

JOHN MORRIS, Town House, Hereford: FIRST PRIZE, 25*l.*, for "Stowe," red, white face, 2 years 7 months 2 weeks 5 days-old; bred by exhibitor; sire, "Sir Thomas"(2228); dam, "Rosalind;" sire of dam, "Chieftain" (930).

HER MAJESTY THE QUEEN, Windsor Castle: SECOND PRIZE, 15*l.*, for "Prince Leopold," red, white face, 2 year 9 months 1 week-old; bred by her Majesty; sire, "Deception;" dam, "Maud;" sire of dam, "Windsor."

RICHARD TANNER, Frodesley, Dorrington, Salop: the *Reserve Number* to "Frodesley," red, white face, 2 year 10 months 6 days-old; bred by exhibitor; sire, "Zadoc;" dam, "Queen;" sire of dam, "Buckton."

Herefords—Yearling Bulls above One and not exceeding Two Years old.

THOMAS EDWARDS, Wintercott, Leominster, Herefordshire: FIRST PRIZE, 25*l.*, for "Leominster 3rd," red, white face, 1 year 2 months 1 week 2 days-old; bred by exhibitor; sire, "Tomboy;" dam, "Primrose;" sire of dam, "Adforton" (1839).

JOHN HARDING, Bicton, Shrewsbury, Salop: SECOND PRIZE, 15*l.*, for "Noble," red, white face, 1 year 6 months 2 weeks 5 days-old; bred by exhibitor; sire, "Sir John" (2769); dam, "Noble;" sire of dam, Garrick (1248).

JOHN BALDWIN, Luddington, Stratford-on-Avon, Warwickshire: the *Reserve Number*, to "Victor," red, white face, 1 year 4 months 2 weeks 1 day-old; bred by exhibitor; sire, "Adolphus;" dam, "Venus 6th;" sire of dam, "Wellington" (1112).

Herefords—Bull Calves above Six and not exceeding Twelve Months old.

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: FIRST PRIZE, 10*l.*, for "Ostorius," red, white face, 10 months 4 weeks 2 days-old; bred by exhibitor; sire, "Brandon;" dam, "Phillis;" sire of dam, "Sir Collin" (2216).

RICHARD TANNER, Frodesley, Dorrington, Salop: SECOND PRIZE, 5*l.*, for "Frodesley Favourite," red, white face, 11 months 1 week 3 days-old

bred by exhibitor; sire, "Frodesley;" dam, "Symmetry;" sire of dam, "Alliance."

HENRY RAWLINS EVANS, Jun., Swanstone Court, Dilwyn, Leominster, Herefordshire: the *Reserve Number*, to "Prince of Wales," red, white face, 10 months 3 weeks 1 day-old; bred by exhibitor; sire, "Chieftain 2nd" (1917); dam, "Lofty;" sire of dam, "Chatham" (1914).

Herefords—Cows above Three Years old.

JAMES D. ALLEN, Tisbury, Salisbury, Wiltshire: FIRST PRIZE, 20*l.*, for "Queen of the Lilies," red, white face, in-milk, 6 years 8 months 2 weeks 6 days-old; bred by the late Mr. James Rea, Monaughty, Knighton, Radnorshire; sire, "Sir Benjamin" (1387); dam, "Lily Border;" sire of dam, "Borderer" (1153).

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: SECOND PRIZE, 10*l.*, for "Lady Adforton," red, white face, in-calf, 5 years 10 months-old; bred by exhibitor; sire, "Pilot" (2156); dam, "Lady Ashford;" sire of dam, "Carbonel" (1525).

HENRY RAWLINS EVANS, Jun., Swanstone Court, Dilwyn, Leominster, Herefordshire: the *Reserve Number*, to "Stately 2nd," red, white face, in-milk, 9 years 3 months 2 weeks 1 day-old; bred by exhibitor; sire, "Rambler" (1046); dam, "Stately;" sire of dam, "Swanstone" (1072).

Herefords—Heifers in-milk or in-calf, not exceeding Three Years old.

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: FIRST PRIZE, 15*l.*, for "Diadem," red, white face, in-calf, 2 years 11 months-old; bred by exhibitor; sire, "Chieftain 4th" (2458); dam, "Deborah;" sire of dam, "Pilot" (2156).

THOMAS ROGERS, Coxall, Brampton-Bryan, Herefordshire: SECOND PRIZE, 10*l.*, for "Queen of the Valley," red, white face, in-calf, 2 years 11 months 2 weeks 3 days-old; bred by exhibitor; sire, "Matchless" (2110); dam, "Nelly;" sire of dam, "Sir Colin" (2216).

HER MAJESTY THE QUEEN, Windsor Castle: THIRD PRIZE, 5*l.*, for "Duchess de Bronté," red, white face, in-calf, 2 year 11 months 2 weeks 1 day-old; bred by her Majesty; sire, "Deception;" dam, "Phœbe;" sire of dam, "Brecon."

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: the *Reserve Number*, to "Lady Leicester," red, white face, in-calf; 2 years 5 months 1 week 3 days-old; bred by exhibitor; sire, "Hampton Oliver;" dam, "Gaylass;" sire of dam, "Riff-Raff."

Herefords—Yearling Heifers above One and not exceeding Two Years old.

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: FIRST PRIZE, 15*l.*, for "Silver Star," red, white face, 1 year 10 months 2 weeks 6 days-old; bred by exhibitor; sire, "Stanway" (2790); dam, "Duchess 3rd;" sire of dam, "Harold" (2029).

PHILIP TURNER, The Leen, Pembridge, Herefordshire: SECOND PRIZE, 10*l.*, for "Minerva," red, white face, 1 year 8 months 2 days-old; bred by exhibitor; sire, "Lancet;" dam, "Kathleen;" sire of dam, "Bolingbroke" (1883).

JOHN CRANE, Benthall, Ford, Shrewsbury, Salop: THIRD PRIZE, 5*l.*, for "Adelaide," red, white face, 1 year 9 months 2 weeks-old; bred by exhibitor; sire, "The Colonel;" dam, "Alberbury;" sire of dam, "Young Sylvester" (1817).

Thomas Fenn, Stonebrook House, Ludlow: *the Reserve Number*, to "Miss Rose," red, white face, 1 year 2 months-old; bred by Mr. T. Rogers, Boxall, Brampton-Bryan; sire, "Battenhall" (2406); dam, "Yellow Rose;" sire of dam, "Grove" (1764).

Herefords—Heifer Calves above Six and under Twelve Months old.

William Tudge, Adforton, Leintwardine, Herefordshire: First Prize, 10*l.*, for "Lady Brandon," red, white face, 11 months 3 weeks 4 days-old; bred by exhibitor; sire, "Brandon;" dam, "Lady Adforton;" sire of dam, "Pilot" (2156).

Thomas Fenn, Stonebrook House, Ludlow: Second Prize, 5*l.*, for "Duchess Bedford 6th," red, white face, 11 months 1 week 5 days-old; bred by exhibitor; sire, "Severn 2nd" (2747); dam, "Duchess Bedford," sire of dam, "Arthur Napoleon" (910).

Thomas Rogers, Coxall, Brampton-Bryan, Herefordshire, the *Reserve Number*, to "Coxall Beauty," red, white face; 11 months 3 weeks 6 days-old; bred by exhibitor; sire, "Sir Thomas" (2228); dam, "Victoria;" sire of dam, "Young Royal" (1470).

Devons—Bulls above Three Years old.

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: First Prize, 25*l.*, for "Master Ellic," red, 5 year 1 month 3 weeks 6 days-old; bred by Sir A. A. Hood, Bart., St. Audries, Bridgwater, Somersetshire; sire, "Viscount;" dam, "Lily."

Viscount Falmouth, Tregothnan, Truro, Cornwall: Second Prize, 15*l.*, for "Sunflower," red, 6 years 4 months 4 weeks-old; bred by exhibitor; sire, "Duke of Chester" (404); dam, "Flower;" sire of dam, "Uncle Tom" (328).

William Smith, Hoopern, Exeter, Devonshire: the *Reserve Number*, to "Constitution," brown, 4 years 4 months 5 days-old; bred by Mr. Thomas Rew, Great Heaselby, North Molton, Devon; sire, "Duke of Flitton" dam, "Broad Horn."

Devons—Bulls above Two and not exceeding Three Years old.

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: First Prize, 25*l.*, for "Master Arthur," red, 2 years 2 months 6 days-old; bred by Sir A. A. Hood, Bart., St. Audries, Bridgwater, Somersetshire; sire, "Master Ellic;" dam, "Miss Battersea;" sire of dam, "Sir Peregrine."

James H. Buller, Downes, Crediton, Devon: Second Prize, 15*l.*, for his red, 2 years 9 months 4 weeks 1 day-old; bred by exhibitor.

William George Nixey, Upton Court Farm, Slough, Bucks: Third Prize, 5*l.*, for "Young Prince of Wales," dark brown, 2 years 6 months-old; bred Mr. John Quartly, Champson-Molland, Devon; sire, "Prince of Wales;" dam, "Famous" (1965).

Devons—Yearling Bulls above One and not exceeding Two Years old.

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: First Prize, 25*l.*, for "Sir George," red, 1 year 6 months 1 week 4 days-old; bred by exhibitor; sire, "Lord Dodington;" dam, "Lady;" sire of dam, "Perfection."

Viscount Falmouth, Tregothnan, Truro, Cornwall: Second Prize, 15*l.*, for "Narcissus," red, 1 year 9 months-old; bred by exhibitor; sire, "Sunflower;" dam, "Picture 4th" (2234); sire of dam, "Napoleon" (464).

JOHN QUARTLY, Champson, South Molton, Devonshire: the *Reserve Number*, to his red, 1 year 4 months 2 weeks-old; bred by exhibitor; sire, "Baronet;" dam, "Pretty Maid" (2253); sire of dam, "Napoleon" (259).

Devons—Bull Calves above Six and not exceeding Twelve Months old.

THOMAS DAVY, Flitton-Barton, North Molton, Devon: FIRST PRIZE, 10*l.*, for "Duke of Flitton 5th," red, 9 months 3 weeks 3 days-old; bred by exhibitor; dam, "Actress;" sire of dam, "Palmerston."

WILLIAM SMITH, Hoopern, Exeter, Devonshire: SECOND PRIZE, 5*l.*, for "Pensylvinian" (898), brown, 9 months 2 days-old; bred by exhibitor; sire, "Eclipse" (836); dam, "Musk" (2883); sire of dam, "Alabama" (774).

GEORGE TURNER, Brampford Speke, Exeter, Devonshire: the *Reserve Number*, to "Prime Minister," red, 6 months 2 weeks-old; bred by exhibitor; sire, "Albert Victor;" dam, "Lady;" sire of dam, "Napoleon."

Devons—Cows above Three Years old.

JAMES DAVY, Flitton-Barton, North Molton, Devon: FIRST PRIZE, 20*l.*, for "Actress," red, in-calf, 9 years 1 month 3 weeks 1 day-old; bred by exhibitor; sire, "Palmerston;" dam, "Temptress;" sire of dam, "Napoleon 3rd."

WILLIAM GEORGE NIXEY, Upton Court Farm, Slough: SECOND PRIZE, 10*l.*, for "Pink," brown, in-calf, 10 years 5 months 1 week 1 day-old; bred by Mr. Shapland, Oakford Farm, North Molton, Devon; dam, "Wellington."

JAMES DAVY, Flitton-Barton: THIRD PRIZE, 5*l.*, for "Princess Alice," red, in-calf, 8 years 6 months 1 week 5 days-old; bred by exhibitor; sire "Duke of Flitton;" dam, "Princess of Prussia;" sire of dam, "Perfection."

JOHN QUARTLY, Champson, South Molton, Devon: the *Reserve Number*, to "Lily," red, in-calf, 4 years 6 months old; bred by exhibitor; sire, "Warrior;" dam, "Stately" (2373); sire of dam, "Duke of Chester" (4021).

Devons—Heifers in-milk or in-calf, not exceeding Three Years old.

WILLIAM GEORGE NIXEY, Upton Court Farm, Slough: FIRST PRIZE, 15*l.*, for dark brown, in-calf, 2 years 8 months 2 weeks-old; bred by Mr. William Smith, Hoopern, Exeter, Devon; sire, "Young Exeter;" dam, "Buttercup."

GEORGE TURNER, Brampford Speke, Exeter, Devonshire: SECOND PRIZE, 10*l.*, for "Duchess 6th," red, in-calf, 2 years 5 months 2 weeks-old; bred by exhibitor; sire, "Albert Victor;" dam, "Duchess 1st;" sire of dam, "Napoleon."

WILLIAM GEORGE NIXEY, Upton Court: THIRD PRIZE, 5*l.*, for "Baroness," light brown, in calf, 2 years 11 months 3 weeks 3 days-old; bred by Mr. Shapland, Oakford Farm, North Molton, Devon; sire, "Alabama;" dam, "Princess" (2279); sire of dam, "Earl" (623).

JOHN QUARTLY, Champson, South Molton, Devon: the *Reserve Number*, to "Beauty," red, in calf, 2 years 4 months 1 week-old; bred by exhibitor; sire, "Prince of Wales;" dam, "Primrose" (2256); sire of dam, "Napoleon" (259).

Devons—Yearling Heifers above One and not exceeding Two Years old.

Richard Burton, Place Barton, Broadclyst, Devon: First Prize, 15*l.*, for "Daisey," brown, 1 year 7 months 3 weeks 5 days-old; bred by exhibitor; sire, "Prince Jerome;" dam, "Graceful;" sire of dam, "Valentine."

Her Majesty the Queen, Windsor Castle: Second Prize, 10*l.*, for "Adelaide," red, 1 year 11 months 4 weeks 1 day-old; bred by her Majesty; sire, "Prince Alfred;" dam, "Verbena;" sire of dam, "Clarendon."

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: Third Prize, 5*l.*, for "Pretty Maid," red, 1 year 7 months 1 week 6 days-old; bred by exhibitor; sire, "St. Audries;" dam, "Young Pink;" sire of dam, "Viscount."

Her Majesty the Queen, Windsor Castle: the *Reserve Number*, to "Rosa," red, 1 year 11 months-old; bred by her Majesty; sire,' "Prince Alfred;" dam, "Daphne;" sire of dam, "Saracen."

Devons—Heifer-Calves above Six and under Twelve Months old.

James H. Buller, Downes, Crediton, Devon: First Prize, 10*l.*, for red, 11 months 3 weeks-old; bred by exhibitor.

George Turner, Brampford Speke, Exeter: Second Prize, 5*l.*, for "Duchess," red, 6 years 3 months-old; bred by exhibitor; sire, "Albert Victor:" dam, "Duchess 7th," sire of dam, "Leotard."

William Smith, Hoopern, Exeter, Devon: the *Reserve Number*, to "Young Butterfly" (314), brown, 11 months 2 weeks 3 days-old; bred by exhibitor; sire, "Prince Alfred;" dam, "Buttercup;" sire of dam, "Young Exeter."

Channel Islands—Bulls above One Year old.

Thomas Statter, jun., Stand Hall, Whitfield, Manchester: First Prize, 15*l.*, for "Milo," smoky, 4 years-old; breeder unknown.

Sir Humphrey de Trafford, Bart., Trafford Park, Manchester: the *Reserve Number*, to "Achievement," mulberry fawn, about 3 years 5 months-old; breeder unknown.

Channel Islands—Cows above Three Years old.

Philip Gaudin, Spring Farm, St. Martin's, St. Helier's, Jersey: First Prize, 15*l.*, for "Camelia," brown and white, in-calf, 3 years 3 weeks-old; bred by exhibitor; dam, "Maid of Plymouth."

Sir Humphrey de Trafford, Bart., Trafford Park, Manchester: Second Prize, 10*l.*, for his light mulberry fawn, in-calf, above 3 years-old; bred by Mr. Barton.

Sir Humphrey de Trafford, Bart., Trafford Park: the *Reserve Number*, to his yellow fawn, in-calf, above 3 years-old; bred by exhibitor.

Channel Islands—Heifers, in-milk or in-calf, not exceeding Three Years old.

Philip Gaudin, Spring Farm, St. Martin's, St. Helier's, Jersey: First Prize, 15*l.*, for "Flora," red and white, in-calf, 1 year 7 months 2 weeks-old; bred by Thomas Filleul, Esq., Boulivot, Grouville, Jersey.

Philip Gaudin, Spring Farm: Second Prize, 10*l.*, for "Fanny Rouget," light red, in-milk, 2 years 2 months-old; bred by exhibitor; dam, "Lady Best."

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: the *Reserve Number*, to "Daisy," smoky fawn, in-milk, 2 years 1 month 3 weeks-old; bred by Mr. C. Killick, Prestwich, Manchester.

Other established breeds—Bulls above One Year old.

RICHARD HEMMING CHAPMAN, Upton, Nuneaton: FIRST PRIZE, 15*l.*, for "Curzon," dark brindled, 5 years 5 months 3 weeks 2 days-old (Longhorn); bred by the late Hon. Robert Curzon, Hagley Hill Farm, Rugeley, Staffordshire; sire, "Hagley Farewell;" dam, "Jackdaw;" sire of dam, "Wyrley Tom."

THE REV. JOHN CUMMING MACDONA, of Hilbre House, West Kirby, Cheshire: SECOND PRIZE, 10*l.*, for "Knight of Kerry," black, 4 years-old (Kerry); bred by Rev. Mr. Maguire, Valentia Island.

Other established breeds—Cows above Three Years old.

JOHN GODFREY, Wigston-Parva, Hinckley, Leicestershire: FIRST PRIZE, 15*l.*, for "Daisy," brindle, 8 years 2 months 1 week-old (Longhorn); bred by exhibitor; sire, "Perfection;" dam, "Brighteye;" sire of dam, "Conqueror."

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: SECOND PRIZE, 10*l.*, for "Rose," blue and white, in-milk, 6 years 5 months-old (Brittany); bred by exhibitor.

Other established breeds,—Heifers in-milk or in-calf, not exceeding Three Years old.

LORD SONDES, Elmham Hall, Thetford, Norfolk: FIRST PRIZE, 15*l.*, red, in-calf, 2 years 4 months-old (Norfolk red polled); bred by exhibitor.

LORD SONDES, Elmham Hall: the *Reserve Number*, to "Crocus 2nd," red, in-calf, 2 years 3 months-old (Norfolk red polled); bred by exhibitor.

**Yorkshire Dairy Cross—Pairs of Cows, in-milk or in-calf, above Three Years old.*

JOHN THOMAS ROBINSON, Leckby Palace, Topcliffe, Thirsk, Yorkshire: FIRST PRIZE, 15*l.*, for "Milkmaid," roan, 12 years-old: "Dairymaid," roan, 6 years-old; both bred by exhibitor.

JOHN WOODHOUSE, Scale Hall, Skirton, Lancaster: SECOND PRIZE, 10*l.*, for "Flora's Rose," roan, 7 years 1 month 1 week 4 days-old: "Snowdrop," white roan, 6 years 2 weeks 5 days-old; both bred by exhibitor.

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: the *Reserve Number*, to "Dairymaid," roan, 4 years 10 months-old; bred by exhibitor; sire, "Duke of Essex;" dam, "Snowdrop:" "Buttercup," roan; age and breeder unknown.

**Yorkshire Dairy Cross—Pairs of Heifers, in-milk, above Two and not exceeding Three Years old.*

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: FIRST PRIZE, 10*l.*, for "Blue Bell," roan, 2 years 10 months-old: "Rose Bud," roan, 2 years 9 months-old; both bred by exhibitor; sire, "Duke of Essex."

JOHN THOMAS ROBINSON, Leckby Palace, Topcliffe, Thirsk, Yorkshire: SECOND PRIZE, 5*l.*, for "Rose," white, 2 years 1 month-old: "Violet," white, 2 years 3 months-old; both bred by exhibitor.

*Yorkshire Dairy Cross—Pens of Three Rearing Calves.

Henry Neild, The Grange, Worsley, Lancashire: First Prize, 8*l*., for "Faith," roan; "Hope," white; "Charity," roan, above 2 months 2 weeks 4 days-old; all bred by exhibitor.

Thomas Statter, jun., Stand Hall, Whitefield, Manchester: Second Prize, 4*l*., for "Aglia," "Thelia," and "Euphrosne," two red, 6 months-old; one roan, 5 months 3 weeks 6 days-old; all bred by exhibitor.

John Thomas Robinson, Leckby Palace, Thirsk, Yorkshire: the *Reserve Number*, to his white, 1 month 2 weeks-old; white, 2 months 1 week-old; red and white, 2 months 2 weeks-old; all bred by exhibitor.

*Ayrshires—Bulls above Two Years old and upwards.

Thomas Statter, jun., Stand Hall, Whitefield, Manchester: First Prize, 15*l*., for "Lord of the Isles," red and white; age and breeder unknown.

David Tweedie, Castle Crawford, Abington, N.B.: Second Prize, 10*l*., for "Clyde," brown and white, 5 years 2 months-old; bred by Mr. J. Williamson, Stonefield, Blantyre, Lanarkshire.

*Ayrshires—Pairs of Cows, in-milk or in-calf, Three Years old and upwards.

David Tweedie, Castle Crawford, Abington, Lanarkshire: First Prize, 15*l*., for "China" and "Lady Mary 10th," red and white, 4 years 2 months-old; both bred by exhibitor.

Lawrence Drew, Merryton, Hamilton, Lanarkshire: Second Prize, 10*l*., for his red and white, 3 years 3 months, and 4 years 4 months-old; both bred by exhibitor.

*Ayrshires—Pairs of Heifers, in-milk or in-calf, Two Years old, and under Three Years.

Thomas Statter, jun., Stand Hall, Whitefield, Manchester: First Prize, 15*l*., for "Polly," red, 2 years 10 months old; "Magpie," red and white, 2 years 11 months old; breeders unknown.

Lawrence Drew, Merryton, Hamilton, Lanarkshire: Second Prize, 10*l*., for his white and red, 2 years 2 months-old; and 2 years 4 months-old; both bred by exhibitor.

*Polled Angus or Aberdeens—Bull Two Years old and upwards.

George Brown, Westertown, Fochabers, N.B.: First Prize, 15*l*., for "March," black, 2 years 3 months 2 weeks 2 days-old; bred by exhibitor; sire, "Success;" dam, "Lady Ann;" sire of dam, "Windsor" (221).

The Earl of Dunmore, Dunmore, Stirling, N.B.: Second Prize, 10*l*., for "Madeira," black, 2 years 5 months 1 week-old; bred by Mr. A. Patterson, Mulben, Elgin, N.B.; sire, "Sultan;" dam, "Magpie."

Thomas Statter. jun., Stand Hall, Whitefield, Manchester: the *Reserve Number* to "King William," black, 2 years 11 months-old; bred by Mr. M'Combie, M.P., Tillyfour, Aberdeen.

*Polled Angus or Aberdeens—Pairs of Cows, in-milk or in-calf, Three Years old and upwards.

Thomas Statter, jun., Stand Hall, Whitefield, Manchester: First Prize, 15*l*., for "Empress" and "Princess," black; ages and breeders unknown.

*Polled Galloways—Bull Two Years old and upwards.

James Graham, Braidlee, Newcastleton, Roxburghshire: First Prize, 15*l.*, for "Blue Bonnet," black, 3 years 5 months 1 week 2 days-old; bred by Mr. J. Shennan, Balig, Kirkcudbright; sire, "The Goat;" dam, "Jeanie Burns;" sire of dam, "Bob Burns."

James Graham, Parcelstown, Westlinton, Carlisle: Second Prize, 10*l.*, for "Sir John the Graham," black, 4 years 5 months 2 weeks 1 day-old; bred by exhibitor; sire, "Glenorchy;" dam, "Semiramis" (703); sire of dam, "Guardsman" (23).

*Polled Galloways—Pairs of Cows, in-milk or in-calf, Three Years old and upwards.

James Graham, Parcelstown, Westlinton, Carlisle: First Prize, 15*l.*, for "Modesty" (225), black, 12 years 1 month 1 week 4 days-old; bred by exhibitor; sire, "Guardsman" (23); dam, "Bess" (211); sire of dam, "Fergy" (19): "Lady Kenmure," black, 8 years old; bred by Mr. J. Grierson, Caigton, Castle Douglas;" sire of dam, "St. Kilda."

James Cunningham, Tarbroch, Dalbeattie, Kirkcudbright: Second Prize, 10*l.*, for "Lousia," black, 3 years 4 months-old; bred by the late W. Maxwell, Esq., Glenlee, New Galloway, Kirkcudbright; sire, "Bob Burns" (35); dam, "Lilly:" "Juno," black, 6 years 2 months 1 week 5 days-old; bred by exhibitor; sire, "Nelson;" sire of dam, "Kirkie."

*Polled Galloways—Pairs of Heifers, in-milk or in-calf, Two Years old and under Three Years.

James Cunningham, Tarbroch, Dalbeattie: First Prize, 15*l.*, for "2nd Bess," black, 2 years 4 months 3 weeks 4 days-old; sire, "Sir John the Graham;" dam, "Modesty;" sire of dam, "Guardsman" (23): "2nd Jess," black, 2 years 4 months 3 days-old; sire, "Sir John the Graham;" dam, "2nd Hermione;" both bred by Mr. J. Graham, Parcelstown, Westlinton, Carlisle.

James Cunningham, Tarbroch, Dalbeattie: Second Prize, 10*l.*, for "Julia," black, 2 years 4 months-old; bred by Mr. J. Thomson, Blaiket, Crocketford, N.B.; sire, "Brigadier:" "Mary," black, 2 years 3 months-old; bred by exhibitor; sire, "Sir John the Graham;" dam, "Juno;" sire of dam, "Nelson."

*Welsh—Bulls Two Years old and upwards.

Llewelyn Lewis, Tan-y-Fynwent, Aber, Carnarvonshire: First Prize, 15*l.*, for "Cadno," black, 3 years 8 months-old; bred by Mr. T. Griffith, Clywnog, Bryn Sciencyn, Anglesea.

Edward Humphries, Royal Hotel, Carnarvon: Second Prize, 10*l.*, for black, 4 years 2 months-old; bred by Mr. Williams, Castellion, Llansadurn, Anglesea.

*Welsh—Pairs of Cows, in-milk or in-calf, Three Years old and upwards.

Llewelyn Lewis, Tan-y-Fynwent, Aber, Carnarvonshire: First Prize, 15*l.*, for "Mynig" and "Llaethog," black; ages and breeders unknown.

**Kerry—Pairs of Cows, in-milk or in-calf, Three Years old and upwards.*

THE REV. JOHN C. MACDONA, Hilbre House, West Kirby, Cheshire: FIRST PRIZE, 15*l.*, for "Kathleen Mavourneen" and "Norah Criena," above 3 years-old; bred by Mr. D. Lynch, Valentia Island, Ireland.

THOMAS STATTER, jun., Stand Hall, Whitefield, Manchester: SECOND PRIZE, 10*l.*, for "Lucy" and "Jenny;" ages and breeders unknown.

SHEEP.

Leicesters—Shearling Rams.

GEORGE HENRY SANDAY, Holme-Pierrepont, Nottinghamshire: FIRST PRIZE, 20*l.*, for his 1 year 3 months 2 weeks-old; bred by exhibitor.

JOHN BORTON, Barton House, Malton, Yorkshire: SECOND PRIZE, 10*l.*, for his 1 year 3 months 2 weeks-old; bred by exhibitor.

LIEUT.-COLONEL WILLIAM INGE, Thorpe Constantine, Tamworth: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by exhibitor.

LIEUT.-COLONEL INGE, the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

Leicesters—Rams of any other Age.

JOHN BORTON, Barton House, Malton: FIRST PRIZE, 20*l.*, for his 4 years 3 months old; bred by exhibitor.

GEORGE HENRY SANDAY, Holme-Pierrepont, Notts.: SECOND PRIZE, 10*l.*, for his 3 years 3 months 2 weeks-old; bred by exhibitor.

JOHN BORTON, Barton House: THIRD PRIZE, 5*l.*, for "Blue Cap," 2 years 3 months old; bred by exhibitor.

GEORGE TURNER, jun., Alexton Hall, Uppingham, Leicestershire: the *Reserve Number*, to his 3 years 3 months 1 week-old; bred by exhibitor.

Leicesters—Pens of Five Shearling Ewes of the same Flock.

LIEUT.-COLONEL WILLIAM INGE, Thorpe Constantine, Tamworth: FIRST PRIZE, 15*l.*, for his 1 year 4 months-old; bred by exhibitor.

SAMUEL WILEY, Brandsby, Yorkshire: SECOND PRIZE, 10*l.*, for his 1 year 2 months 2 weeks-old; bred by exhibitor.

JOHN BORTON, Barton House, Malton: THIRD PRIZE, 5*l.*, for his 1 year 3 months 2 weeks-old; bred by exhibitor.

TEASDALE H. HUTCHINSON, Manor House, Catterick, Yorkshire: the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

Cotswolds—Shearling Rams.

THOMAS GILLETT, Kilkenny Farm, Farringdon: FIRST PRIZE, 20*l.*, for his 1 year 3 months 1 weeks-old; bred by exhibitor.

THOMAS GILLETT: SECOND PRIZE, 10*l.*, for his 1 year 4 months-old; bred by exhibitor.

THOMAS BROWN, Marham Hall Farm, Downham-Market, Norfolk: SECOND PRIZE, 5*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

Thomas Brown: the *Reserve Number*, to his 1 year 4 months 2 weeks-old; bred by exhibitor.

Cotswolds—Rams of any other Age.

Thomas Brown, Marham Hall Farm: First Prize, 20*l.*, for his 2 years 4 months 2 weeks-old; bred by exhibitor.

Thomas Brown: Second Prize, 10*l.*, for his 2 years 4 months 2 weeks-old; bred by exhibitor.

Edward Handy, Sierford, Cheltenham: Third Prize, 5*l.*, for his 4 years 2 months 2 weeks-old; bred by exhibitor.

Cotswolds—Pens of Five Shearling Ewes of the same Flock.

John Gillett, Oaklands, Charlbury, Oxon.: First Prize, 15*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

Lincolns and other Long Wools—Shearling Rams.

Messrs. Dudding, Panton House, Wragby, Lincolnshire: First Prize, 20*l.*, for their 1 year 3 months 3 weeks-old; bred by exhibitors.

The Hon. R. Henley Eden, Cotgreave Place, Nottingham: Second Prize, 5*l.*, for his 1 year 2 months 3 weeks-old; bred by exhibitor.

Messrs. Dudding, Panton House: Third Prize, 5*l.*, for their 1 year 3 months 3 weeks-old; bred by exhibitors.

Messrs. Dudding: the *Reserve Number*, to their 1 year 3 months 3 weeks-old; bred by exhibitors.

Lincolns and other Long Wools—Rams of any other Age.

William Francis Marshall, Branston Villa, Lincoln: First Prize, 20*l.*, for his 3 years 4 months 2 weeks-old; bred by the late Mr. T. B. Marshall.

Messrs. Dudding, Panton House: Second Prize, 10*l.*, for their "Young Champion," 3 years 3 months 3 weeks-old; bred by exhibitors.

William Francis Marshall: Third Prize, 5*l.*, for his 3 years 4 months 2 weeks-old; bred by the late Mr. T. B. Marshall.

Thomas Cartwright, Dunston Pillar, Lincoln: the *Reserve Number*, to his 2 years 2 months 2 weeks-old; bred by the executors of the late Mr. J. Mayfield, Dogdyke, Coningsby, Boston.

Lincolns and other Long Wools—Pens of Five Shearling Ewes of the same Flock.

Thomas Cartwright, Dunston Pillar, Lincoln: First Prize, 15*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

John Pears, Mere, Branston, Lincoln: Second Prize, 10*l.*, for his 1 year 4 months-old; bred by exhibitor.

Thomas Cartwright: Third Prize, 5*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

J. and R. Earnshaw, Grindleton, Clitheroe, Lancashire: the *Reserve Number*, to their 1 year 3 months-old; bred by exhibitors.

Oxfordshire Downs—Shearling Rams.

George Wallis, Old Shifford, Bampton, Faringdon: First Prize, 20*l.*, for his 1 year 5 months 2 weeks-old; bred by exhibitor.

George Wallis: Second Prize, 10*l.*, for his 1 year 5 months 2 weeks-old; bred by exhibitor.

A. F. Milton Druce, Burghfield, Reading: Third Prize, 5*l.*, for his 1 year 5 months-old; bred by exhibitor.

George Wallis, Old Shifford: the *Reserve Number*, to his 1 year 5 months 2 weeks-old; bred by exhibitor.

Oxfordshire Downs—Rams of any other Age.

John Treadwell, Upper Winchendon, Aylesbury: First Prize, 20*l.*, for his 3 years 5 months-old; bred by Mr. C. Gillett, Cote House, Faringdon.

George Wallis, Old Shifford, Bampton, Faringdon: Second Prize, 10*l.*, for his 2 years 5 months 2 weeks-old; bred by exhibitor.

George Wallis: Third Prize, 5*l.*, for his 2 years 5 months 2 weeks-old; bred by exhibitor.

John Treadwell, Upper Winchendon: the *Reserve Number*, to his 3 years 4 months 2 weeks-old; bred by exhibitor.

Oxfordshire Downs—Pens of Five Shearling Ewes of the same Flock.

George Wallis, Old Shifford: First Prize, 15*l.*, for his 1 year 5 months 2 weeks-old; bred by exhibitor.

Frederick Gillett, Upton Downs, Burford, Oxon.: Second Prize, 10*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

John Treadwell, Upper Winchendon: the *Reserve Number*, to his 1 year 4 months 2 weeks-old; bred by exhibitor.

South Downs—Shearling Rams.

Lord Walsingham, Merton Hall, Thetford, Norfolk: First Prize, 20*l.*, for his 1 year 4 months-old; bred by exhibitor.

Lord Walsingham: Second Prize, 10*l.*, for his 1 year 4 months-old; bred by exhibitor.

Lord Walingham: Third Prize, 5*l.*, for his 1 year 4 months-old; bred by exhibitor.

Lord Walsingham: the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

South Downs—Rams of any other Age.

Sir William Throckmorton, Bart., Buckland, Faringdon: First Prize, 20*l.*, for his 2 years 3 months 2 weeks-old; bred by exhibitor.

Sir William Throckmorton, Bart.: Second Prize, 10*l.*, for his 2 years 4 months-old; bred by exhibitor.

Lord Walsingham: Third Prize, 5*l.*, for his 4 years 4 months-old; bred by exhibitor.

Lord Sondes, Elmhall Hall, Thetford, Norfolk: the *Reserve Number*, to his 2 years 4 months-old; bred by exhibitor.

South Downs—Pens of Five Shearling Ewes of the same Flock.

Lord Sondes, Elmham Hall: First Prize, 15*l.*, for his 1 year 4 months-old; bred by exhibitor.

Sir William Throckmorton, Bart., Buckland, Faringdon: Second Prize, 10*l.*, for his 1 year 4 months-old; bred by exhibitor.

Lord Walsingham, Merton Hall: Third Prize, 5*l.*, for his 1 year 4 months-old; bred by exhibitor.

The Duke of Richmond, K.G., Goodwood, Chichester, Sussex: the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

Shropshires—Shearling Rams.

Lord Chesham, Latimer, Chesham, Bucks: First Prize, 20*l.*, for his 1 year 4 months-old; bred by exhibitor.

John Coxon, Freeford Farm, Lichfield: Second Prize, 10*l.*, for "Chancellor," 1 year 3 months 1 week-old; bred by exhibitor.

Mrs. Beach, The Hattons, Breewood, Penkridge, Staffordshire: Third Prize, 5*l.*, for "Young Cardinal," 1 year 3 months-old; bred by the late Mr. J. Beach.

Lord Chesham, Latimer, the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

Shropshires—Rams of any other Age.

Henry Matthews, Montford, Shrewsbury: First Prize, 20*l.*, for "Leviathan," 3 years 3 months 2 weeks-old; bred by exhibitor.

Thomas Horton, Harnage Grange, Shrewsbury: Second Prize, 10*l.*, for his 2 years 4 months-old; bred by exhibitor.

Mrs. P. W. Bowen, Shrawardine Castle, Shrewsbury: Third Prize, 5*l.*, for her 2 years 3 months 3 weeks-old; bred by the late Mr. P. W. Bowen.

Charles Byrd, Littywood, Stafford: the *Reserve Number*, to "Black Prince," 2 years 3 months 3 weeks-old; bred by exhibitor.

Shropshires—Pens of Five Shearling Ewes, of the same Flock.

Thomas Nock, Sutton-Maddock, Shifnal: First Prize, 15*l.*, for his 1 year 4 months 2 weeks-old; bred by exhibitor.

Lord Chesham, Latimer: Second Prize, 10*l.*, for his 1 year 4 months-old; bred by exhibitor.

Henry Wood, Pucknall Farm, Romsey, Hants: Third Prize, 5*l.*, for his 1 year 4 months-old; bred by exhibitor.

Lord Chesham, Latimer: the *Reserve Number*, to his 1 year 4 months-old; bred by exhibitor.

Hampshires and other Short Wools—Shearling Rams.

Alfred Morrison, Fonthill House, Tisbury, Wilts: First Prize, 20*l.*, for his 1 year 5 months 2 weeks-old; bred by exhibitor.

Alfred Morrison: Second Prize, 10*l.*, for his 1 year 5 months 2 weeks-old; bred by exhibitor.

James Rawlence, Bulbridge, Wilton, Salisbury: Third Prize, 5*l.*, for his 1 year 5 months 1 week-old; bred by exhibitor.

Robert and John Russell, Horton-Kirby, Dartford, Kent: the *Reserve Number*, to their 1 year 5 months 1 week-old; bred by exhibitors.

Hampshires and other Short Wools—Rams of any other Age.

Robert and John Russell, Horton-Kirby: First Prize, 20*l.*, for their 2 years 5 months 1 week-old; bred by exhibitors.

James Rawlence, Bulbridge: Second Prize, 10*l.*, for his 3 years 5 months-old; bred by exhibitor.

James Rawlence: the *Reserve Number*, to his 2 years 5 months-old; bred by exhibitor.

Hampshires and other Short Wools—Pens of Five Shearling Ewes of the same Flock.

James Rawlence: First Prize, 15*l.*, for his 1 year 5 months-old; bred by exhibitor.

James Rawlence: Second Prize, 10*l.*, for his 1 year 5 months-old; bred by exhibitor.

Lonks—Shearling Rams.

Joseph Midgley Green, Black Hill, Keighley, Yorkshire: First Prize, 20*l.*, for his 1 year 2 months 2 weeks-old; bred by J. B. Sedgwick, Esq., Riddlesden, Keighley.

Lawrence Duckworth, Sheep Hey, Ramsbottom, Lancashire: Second Prize, 10*l.*, for his 1 year 2 months 4 days-old; bred by A. Midgeley, Esq., Knowl Top, Clitheroe.

Jonathan Peel, Knowlmere Manor, Clitheroe, Lancashire: Third Prize, 5*l.*, for his 1 year 3 months-old; breeder unknown.

Lonks—Rams of any other Age.

Jonathan Peel: First Prize, 20*l.*, for "King of the Fells," 5 years 3 months 1 week-old; bred by exhibitor.

Jonathan Peel: Second Prize, 10*l.*, for "Fell King," 3 years 3 months 3 weeks-old; bred by exhibitor.

Joseph Midgley Green: the *Reserve Number*, to his 2 years 2 months-old; bred by Mr. J. Hoyle, Laycock, Keighley.

Lonks—Pen of Five Ewes.

Jonathan Peel: First Prize, 15*l.*, for his 2 years 3 months 3 weeks-old; bred by exhibitor.

Jonathan Peel: Second Prize, 10*l.*, for his 1 year 3 months 2 weeks-old; bred by exhibitor.

Jonathan Peel: the *Reserve Number*, to his 5 years 3 months-old; bred by exhibitor.

Herdwicks—Shearling Rams.

George Browne, Troutbeck, Windermere, Westmoreland: First Prize, 20*l.*, for "Buck Horns," 1 year 2 months-old; bred by exhibitor.

George Browne: Second Prize, 10*l.*, for "Duke of Manchester," 1 year 1 month 3 weeks 4 days-old; bred by exhibitor.

George Irving, Wythop Hall, Cockermouth, Cumberland: Third Prize, 5*l.*, for his 1 year 2 months 2 weeks-old; bred by exhibitor.

John Smith, Branthwaite, Caldbeck, Cumberland: the *Reserve Number*, to "Tom," 1 year 2 months 1 week 3 days-old; bred by exhibitor.

Herdwicks—Rams of any other Age.

Richard Browne, Troutbeck, Windermere: First Prize, 20*l.*, for "Young Nero," 3 years 2 months 1 week-old; bred by Mr. J. Dawson, Mockerkin, Loweswater, Cockermouth.

George Browne, Troutbeck: Second Prize, 10*l.*, for "Broken Horn," 3 year 2 months 2 weeks-old; bred by exhibitor.

Richard Browne, Troutbeck: Third Prize, 5*l.*, for "Royal Moorcock," 6 years 2 months 1 week-old; bred by exhibitor.

John Smith, Branthwaite, Caldbeck, Cumberland: the *Reserve Number*, to "Nabob," 6 years 2 months 1 week-old; bred by Mr. Allen Pearson, Bridgend, Larten, Cockermouth.

Herdwicks—Pens of Five Ewes.

Edward Nelson, Gatesgarth, Buttermere, Cockermouth: First Prize, 15*l.*, for his 2 years 1 month 2 weeks-old; bred by exhibitor.

George Irving, Wythop Hall, Cockermouth: Second Prize, 10*l.*, for his various ages; bred by exhibitor.

George Browne, Troutbeck, Windermere: the *Reserve Number*, to his 1 year 2 months 2 weeks-old; bred by exhibitor.

**Cheviots—Shearling Rams.*

John Robson, Bymess, Rochester, Northumberland: First Prize, 10*l.*, for his 1 year 3 months 2 weeks-old; bred by exhibitor.

John M'Gregor, Bell Ridding, Torthorwald, Dumfries: Second Prize, 5*l.*, for his 1 year 3 months 1 week 4 days-old; bred by exhibitor.

John Robson, the *Reserve Number*, to his 1 year 3 months 2 weeks-old; bred by exhibitor.

**Cheviots—Rams of any other Age.*

John Robson: First Prize, 10*l.*, for his 2 years 3 months 2 weeks-old; bred by exhibitor.

John Robson: Second Prize, 5*l.*, for "Hopey," 4 years 3 months 2 weeks-old; bred by exhibitor.

**Cheviots—Pens of Five Shearling Ewes.*

John M'Gregor, Bell Ridding: First Prize, 10*l.*, for his 1 year 3 months-old; bred by exhibitor.

**Limestones—Shearling Rams.*

Rowland Parker, Moss End, Burton, Westmoreland: First Prize, 10*l.*, for "Sir Peter," 1 year 2 months 3 weeks-old; bred by exhibitor.

Rowland Parker: Second Prize, 5*l.*, for "Duke William," 1 year 3 months-old; bred by exhibitor.

**Limestones—Rams of any other Age.*

Rowland Parker: First Prize, 5*l.*, for "Lord John," 3 years 2 months 2 weeks-old; bred by Mr. J. Wilson, Farleton, Burton.

**Limestones—Pens of Two Shearling Ewes.*

Rowland Parker: First Prize, 10*l.*, for his 1 year 2 months 2 weeks-old; bred by exhibitor.

Rowland Parker: Second Prize, 5*l.*, for his 1 year 2 months 2 weeks-old; bred by exhibitor.

*Border Leicesters—Shearling Ram.

J. and G. Laing, Cornhill, Northumberland: First Prize, 10*l.*, for their 1 year 3 months-old; bred by exhibitors.

J. and G. Laing: Second Prize, 5*l.*, for their 1 year 3 months-old; bred by exhibitors.

Joseph and William Dinning, Nilstone Ridge, Haydon Bridge, Northumberland: the *Reserve Number*, to "Nelson," 1 year 2 months 3 weeks 5 days-old; bred by exhibitors.

*Border Leicesters—Rams of any other Age.

Joseph and William Dinning: First Prize, 10*l.*, for "Northumberland," 2 years 3 months-old; bred by exhibitors.

John Watson, Gelt Hall, Castle Carrock, Carlisle: Second Prize, 5*l.*, for his 3 years 2 months 2 weeks, 6 days-old; bred by exhibitor.

John Watson: the *Reserve Number*, to his 2 years 4 months-old; bred by exhibitor.

*Border Leicesters—Pens of Five Shearling Ewes.

Joseph and William Dinning: First Prize, 10*l.*, for his 1 year 2 months 3 weeks 2 days-old; bred by exhibitors.

John Angus, jun., Whitefield, Morpeth, Northumberland: Second Prize, 5*l.*, for his 1 year 4 months-old; bred by exhibitor.

John Watson: the *Reserve Number*, to his 1 year 2 months 3 weeks 2 days-old; bred by exhibitor.

*Black-faced Scotch—Ram of any Age.

John Irving, Shap Abbey, Westmoreland: First Prize, 10*l.*, for "Tom Sayers," 1 year 3 months-old; bred by exhibitor.

John Irving: Second Prize, 5*l.*, for "Old Monk," 2 years 3 months-old; bred by exhibitor.

A. W. Long, Mint Cottage, Kendal, Westmorland: the *Reserve Number*, to "Billie," 1 year 2 months 4 weeks 1 day-old; bred by exhibitor.

*Black-faced Scotch—Pens of Five Shearling Ewes.

Adamson Bell, Garrigell, Alston, Cumberland: First Prize, 10*l.*, for his 1 year 3 months-old; bred by exhibitor.

John Irving: Second Prize, 5*l.*, for his 1 year 3 months-old; bred by exhibitor.

James Atkinson, Brackenthwaite, Cumrew, Carlisle: the *Reserve Number*, to his 1 year 2 months 2 weeks-old; bred by Mr. F. Moscrop, Butter Burn, Rose Hill, Gisland, Cumberland.

PIGS.

Boars of a Large White Breed, above Twelve Months old.

Richard Elmhirst Duckering, Northorpe, Kirton-in-Lindsey, Lincolnshire: First Prize, 10*l.*, for "Wallace," 1 year 6 months 2 weeks-old (improved Lincoln); bred by exhibitor; sire, "Victor;" dam, "Countess of Leicester;" sire of dam, "Cultivator 2nd."

MATTHEW WALKER, Stockley Park, Anslow, Burton-on-Trent: SECOND PRIZE, 5*l*., for "Robin Hood;" bred by Mr. Duckering, Northorpe, Kirton-Lindsey, Lincolnshire; sire, "Cultivator;" dam, "Countess of Leicester."

JAMES and FREDERICK HOWARD, Britannia Farms, Bedford: the *Reserve Number*, to "Victor 2nd," 1 year 1 week 2 days-old; bred by exhibitor; sire "Victor 1st;" dam, "Longville;" sire of dam, "Golden Spur."

Boars of a Large White Breed, above Six and not exceeding Twelve Months old.

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey, Lincolnshire: FIRST PRIZE, 10*l*., for "Oscar," 10 months 2 weeks-old (improved Lincoln); bred by exhibitor; sire, "Cultivator 5th;" dam, "Minna;" sire of dam, "Cultivator 3rd."

PETER EDEN, Cross Lane, Salford, Manchester: SECOND PRIZE, 5*l*., for "Eclipse," 10 months 3 weeks 1 day-old; bred by exhibitor; sire, "Goliah;" dam, "Lucy."

THOMAS BANTOCK, Merridale House, Wolverhampton, Staffordshire: the *Reserve Number*, to "Young Joe," 10 months-old; bred by exhibitor; sire, "Bedford Joe."

Boars of a Small White Breed, above Twelve Months old.

PETER EDEN, Cross Lane, Salford, Manchester: FIRST PRIZE, 10*l*., for "Young King," 2 years 3 weeks 5 days-old; bred by Mr. W. Hutton, Addingham, Leeds, Yorkshire; sire, "Old King;" dam, "Miss Lucy."

JOHN SAGAR, Lister Hills, Bradford, Yorkshire: SECOND PRIZE, 5*l*., for "Pretender," 1 year 10 months 4 weeks-old; bred by exhibitor; sire, "Prince of Wales;" dam, "May Queen;" sire of dam, "Old Turk."

LORD WENLOCK, Escrick Park, York: the *Reserve Number*, to "Brutus 3rd," 1 year 3 weeks-old; bred by exhibitor; sire, "Cumberland;" dam, "Snowdrop."

Boars of Small White Breed, above Six and not exceeding Twelve Months old.

JAMES MAXWELL, Mossdale House, Aigburth, Liverpool: FIRST PRIZE, 10*l*., for "Young Prince," 11 months 2 weeks 2 days-old; bred by exhibitor.

PETER EDEN of Cross Lane: SECOND PRIZE, 5*l*., for 10 months 1 week 4 days-old; bred by exhibitor; sire, "King Lear 2nd:" dam, "Empress;" sire of dam "King Lear 1st."

HENRY NEILD, The Grange, Worsley, Lancashire: the *Reserve Number*, to his 8 months 2 weeks 1 day-old; bred by W. E. E. Kershaw, Esq., Beech House, Middleton, Lancashire; sire, "King of Trumps;" dam, "Kate."

Boars of a Small Black Breed.

THOMAS COMBER, Rainhill, Prescot, Lancashire: FIRST PRIZE, 10*l*., for "Pretender;" 1 year 2 months 1 day-old; bred by G. M. Sexton, Esq., Wherstead Hall, Ipswich.

THOMAS GANKROGER, 4, Clarendon Place, Halifax: SECOND PRIZE, 5*l*., for his 1 year 7 months 2 days-old; bred by George Swallow, Esq., Stun Mills, Halifax, Yorkshire.

Boars of the Berkshire Breed.

JOSEPH WHITWORTH, Stancliffe Hall, Matlock, Derbyshire: FIRST PRIZE, 10*l.*, for "King Pippin's Grandson," black, 1 year 2 weeks 1 day-old; bred by exhibitor.

HEBER HUMFREY, Kingstone Farm, Shrivenham, Berkshire: SECOND PRIZE, 5*l.*, for "Delightful," black and little white, 1 year 1 month-old; bred by exhibitor; sire, "Souse Genteel;" dam, "Delight;" sire of dam, "No. 41."

JOSEPH SMITH, Henley-in-Arden, Warwickshire: the *Reserve Number*, to his "Matchless," black, with little white, 1 year 2 weeks 2 days-old; bred by exhibitor; sire, "Young Henley;" dam, "Lady Birmingham."

Boars of a Breed not eligible for the preceding classes.

JOHN SAGAR, Lister Hills, Bradford, Yorkshire: FIRST PRIZE, 10*l.*, for "Young Prince of Airedale," white, 2 years 1 month-old (middle); bred by Mr. Thomas Phillip, Red Lion, Skipton, Yorkshire; sire, "Prince of Airedale;" dam, "Airedale Queen;" sire of dam, "Short Tail."

PETER EDEN, Cross Lane, Salford: SECOND PRIZE, 5*l.*, for "King Lear 2nd," white, 3 years 1 month 2 weeks 4 days-old (middle); bred by exhibitor; sire, "King Lear 1st;" dam, "Pride of the Village."

JAMES AND FREDERICK HOWARD, Britannia Farms, Bedford: the *Reserve Number*, to "Hero 2nd," white, 2 years 3 weeks-old (middle); bred by exhibitors; sire, "Hero 1st;" dam, "Longville;" sire of dam, "Golden Spur."

Breeding Sows of a Large White Breed.

PETER EDEN, Cross Lane: FIRST PRIZE, 10*l.*, for "Acorn," 2 years 4 months-old; bred by William Gamon, Esq., Chester; sire, "Furemould;" dam, "Lady Havelock."

RICHARD ELMHIRST DUCKERING, Northorpe: SECOND PRIZE, 5*l.*, for "Primrose," 2 years 2 months-old (improved Lincoln); bred by exhibitor; sire, "Victor;" dam, "Wasp;" sire of dam, "Cultivator."

PETER EDEN of Cross Lane, Salford: the *Reserve Number*, to "Morning Star," 2 years 11 months-old; sire, "John;" dam, "Matchless."

Breeding Sows of a Small White Breed.

RICHARD ELMHIRST DUCKERING, Northorpe: FIRST PRIZE, 10*l.*, for "Little Queen," 2 years 1 week-old; bred by exhibitor; sire, "Comet;" dam, "White Rose;" sire of dam, "Hermit."

JOHN SAGAR, Lister Hills, Bradford, Yorkshire: SECOND PRIZE, 5*l.*, for "Beauty," 1 year 10 months 4 weeks-old; bred by exhibitor; sire, "Prince of Wales," dam, "May Queen;" sire of dam, "Old Turk."

WILLIAM HATTON, Addingham, Leeds: the *Reserve Number*, to "Queen of the West," in-pig, 1 year 1 month-old; bred by Mr. Joseph Wall of Addingham, Leeds, Yorkshire; sire, "Young King of the West; dam, "Lady Havelock."

Breeding Sows of a Small Black Breed.

THE REV. W. HOLT BEEVER, Pencraig Court, Ross, Herefordshire: FIRST PRIZE, 10*l.*, for "Black Diamond 5th," 1 year 3 months 3 weeks-old (Ryeland); bred by exhibitor; sire, "Black Prince 1st;" dam, "Black Diamond 3rd;" sire of dam, "Black Prince."

THOMAS COMBER, Rainhill: SECOND PRIZE, 5*l.*, for "Morna," 1 year 6 months 2 weeks 5 days-old; bred by Mr. G. M. Sexton, Wherstead Hall, Ipswich, Suffolk.

THOMAS GANKROGER, 4 Clarendon Place, Halifax: the *Reserve Number*, to his (in-pig), 1 year 10 months 2 weeks-old; bred by Mr. Sexton, Wherstead Hall, Ipswich, Suffolk.

Breeding Sows of the Berkshire Breed.

ARTHUR STEWART, Saint Bridge House, Gloucester: FIRST PRIZE, 10*l.*, for "Octoroon," black, with little white, (in-pig), 10 months 4 days-old; bred by exhibitor; sire, "Sampson;" dam, "Sniper;" sire of dam, "Tim Whiffler."

HEBER HUMFREY, Kingstone Farm: SECOND PRIZE, 5*l.*, for his "Southend," black, with little white (in-pig), 1 year 3 months 1 week 5 days-old; bred by exhibitor; sire, "Souse Genteel;" dam, "No. 76."

ARTHUR STEWART, Saint Bridge House: the *Reserve Number*, to "Quadroon," black, with little white (in-pig), 1 year 2 months 6 days-old; bred by exhibitor; sire, "Blacksmith;" dam, "Beauty;" sire of dam, "Teddy."

Breeding Sows of a Breed not eligible for the preceding Classes.

WILLIAM PAEKER, Golden Lion, Leeds Road, Bradford, Yorkshire: FIRST PRIZE, 10*l.*, for "Rose of Yorkshire," white, 1 year 7 months 3 weeks-old (middle); bred by exhibitor; sire, "Prince of Airedale;" dam, "Princess."

PETER EDEN, Cross Lane, Salford: SECOND PRIZE, 5*l.*, for "Countess," white, 2 years 7 months 3 weeks-old (middle); bred by Henry Neild, Esq., Worsley, Manchester; sire, "Perfect Cure;" dam, "Countess."

JAMES and FREDERICK HOWARD, Britannia Farms, Bedford: the *Reserve Number*, to "Miss Kate," white (in-pig), 2 years 4 weeks-old (middle); bred by exhibitor; sire, "Hero;" dam, "Betsy."

Pens of Three Breeding Sow Pigs of a Large White Breed, of the same Litter, above Four and under Eight Months old.

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey: FIRST PRIZE, 10*l.*, for "White Rose," "Snowdrop," "Tulip," 7 months 3 weeks 1 day-old (improved Lincolnshire); bred by exhibitor; sire, "Goliah;" dam, "Queen Bess;" sire of dam, "Cultivator."

PETER EDEN, Cross Lane, Salford: SECOND PRIZE, 5*l.*, for his 7 months 3 weeks 1 day-old; bred by exhibitor; sire, "Goliah;" dam, "Lady Ellen."

JAMES and FREDERICK HOWARD, Britannia Farms, Bedford: the *Reserve Number*, to their 6 months 1 week 5 day-old; bred by exhibitors; sire, "Steam Work;" dam, "Longville;" sire of dam, "Golden Spur."

Pens of Three Breeding Sow Pigs of a Small White Breed, of the same Litter, above Four and under Eight Months old.

PETER EDEN, Cross Lane, Salford: FIRST PRIZE, 10*l.*, for his 7 months 2 weeks 5 days-old; bred by exhibitor; sire, "Lord Nelson;" dam, "Fairy."

SIR GEORGE O. WOMBWELL, Bart., Newburgh Park, Easingwold, Yorkshire: SECOND PRIZE, 5*l.*, for his 7 months 2 weeks 3 days-old; bred by exhi-

bitor; sire, "Beadsman 4th;" dam, "Red Rose;" sire of dam, "Beadsman 3rd."

Sir George O. Wombwell, Bart.: the *Reserve Number*, to his 7 months 2 weeks-old; bred by exhibitor; sire, "Beadsman 4th;" dam, "White Rose;" "sire of dam, "Beadsman 3rd."

Pens of Three Breeding Sow Pigs of a Small Black Breed, of the same Litter, above Four and under Eight Months old.

Thomas Gankroger, 4, Clarendon Place, Halifax: First Prize, 10*l.*, for his 7 months 3 weeks 5 days-old; bred by exhibitor.

Pens of Three Breeding Sow Pigs of the Berkshire Breed, of the same Litter, above Four and under Eight Months old.

The Rev. Henry G. Baily, Swindon, Wiltshire: First Prize, 10*l.*, for his black and white, 7 months 3 weeks 6 days-old; bred by exhibitor; sire, "Lord Chancellor;" dam, "Nonsuit;" sire of dam, "King Pippin."

Pens of Three Breeding Sow Pigs of a Breed not eligible for the preceding Classes, of the same Litter, above Four and under Eight months old.

Peter Eden, Cross Lane, Salford: First Prize, 10*l.*, for his white, 7 months 3 weeks 4 days-old (middle); bred by exhibitor; sire, "Prince;" dam, "Buttercup."

Peter Eden, Cross Lane: Second Prize, 5*l.*, for his white, 7 months 2 weeks 6 days-old (middle); bred by exhibitor; sire, "King Lear 2nd;" dam, "Tulip."

Martin Newton, Oldfield, Altrincham, Cheshire: the *Reserve Number*, to his white and blue, 7 months 2 weeks 2 days-old (Essex and White Salford); bred by exhibitor.

BUTTER.

**Three Pounds of Fresh Butter, made up in Half Pounds.*

Henry Neild, The Grange, Worsley, Lancashire: First Prize, 6*l.* and Cup.
George Turner, Higher Ingersley, Rainow, Bollington, Macclesfield: Second Prize, 4*l.*
S. Davies, Eardswick Hall, Minshull-Vernon, Middlewich: Third Prize, 3*l.*
William Hough, Mill Farm Mere, Knutsford: Fourth Prize, 2*l.*

**Tubs or Crocks of Butter, not less than 14 lbs. Weight.*

William Harpur, Bury, Lancashire: First Prize, 7*l.* and Cup.
William Harpur: Second Prize, 5*l.*
Samuel Davies, Eardswick Hall: Third Prize, 3*l.*

**Tubs or Crocks of Butter, not less than 14 lbs., Weight, the produce of any Foreign Country.*

N. S. & R. Crompton, 13 and 15, Mark Lane, Manchester: Second Prize, 5*l.*

CHEESE.

**Four Cheeses, uncoloured, made in 1868, above 60 lbs. weight each.*

George Willis, Ridley Hall, Tarporley, Cheshire: First Prize, 15*l.*
George Gibbons, Tunley Farm, Bath, Somersetshire: Second Prize, 10*l.*

**Four Cheeses, coloured, made in 1868, above 60 lbs. weight each.*

Thomas Sheen, Fernley-Lees Farm, Tiverton, Tarporley, Cheshire: First Prize, 15*l.* and Champion.
Elizabeth Siddom, Broxton Hall, Cheshire: Second Prize, 10*l.*

**Four Cheeses, coloured, made in 1868, under 60 lbs. weight each.*

Jabez Mart, Bulkeley, Malpas: Second Prize, 5*l.*

**Four Cheeses, coloured or uncoloured, made in 1869, above 60 lbs. weight each.*

John Vernon, Willington, Tarporley: First Prize, 15*l.* and Champion.
Stephen Millard Harding, Nap Down, Thornbury: Second Prize, 10*l.*

**Four Cheeses, coloured or uncoloured, made in 1869, under 60 lbs. weight each.*

George Prescott, Hulgrave Farm, Minshull-Vernon, Middlewich: First Prize, 10*l.*
George Jackson, Piggot Hill, Old Withington, Congleton: Second Prize, 5*l.*

IMPLEMENTS.

Richard Hornsby and Sons, Spittlegate Iron Works, Grantham, Lincolnshire: First Prize, 20*l.*, for their Patent Paragon Mower.

Walter A. Wood, 77, Upper Thames Street, London: Second Prize, 17*l.*, for his Grass Mowing Machine.

Burgess and Key, Newgate Strret, London: Third Prize, 13*l.*, for their Mowing Machine for two horses.

Samuelson and Co., Britannia Works, Banbury, Oxfordshire: Highly Commended for their two-horse Grass Mowing Machine.

A. C. Bamlett, Vale of Mowbray Works, Thirsk, Yorkshire: Commended for his Two-horse Mower.

W. N. Nicholson, Trent Works, Newark, Nottinghamshire: First Prize, 16*l.*, for his Haymaking Machine.

James and Frederick Howard, Britannia Works, Bedford: Second Prize, 14*l.*, for their Double-action Haymaking Machine.

Richard Hornsby and Sons: First Prize, 25*l.*, for their Governor Self-Raking Reaper "W;" and Second Prize 20*l.*, for their Governor Self-Raking Reaper "H."

Samuelson and Co.: Third Prize, 15*l.*, for their Self-Raking Reaping Machine.

Richard Hornsby and Sons: Highly Commended for their Governor Self-Raking Reaper "K;" and for their Self-Raking Reaper "Progress."

A. C. Bamlett: First Prize, 25*l.*, for his Reaper with Self-Swathe Delivery and Sheafing Rake.

Burgess and Key: Second Prize, 20*l.*, for their Reaping Machine with Self-delivery in Swathe clear of the Horse Track.

Richard Hornsby and Sons: Third Prize, 15*l.*, for their Swathe Delivery Reaper.

The Beverley Iron and Waggon Company, Iron Works, Beverley, Yorkshire: Commended for their two-horse Reaping Machine with Double Self-acting Swathe Delivery, and for their three-horse Reaping Machine with Double Self-acting Swathe Delivery.

Richard Hornsby and Sons: First Prize, 12*l.*, for their Patent Premier two-horse Back Delivery Reaper.

A. C. Bamlett: Second Prize, 10*l.*, for his two-horse Reaper.

Samuelson and Co.: Third Prize, 8*l.*, for their Manual Delivery two-horse Eclipse Reaper.

Samuelson and Co.: First Prize, 20*l.*, for their two-horse Combined Self-Raking, Reaping and Mowing Machine.

Richard Hornsby and Sons: Second Prize, 10*l.*, for their Patent Paragon Combined Mower and Reaper.

A. C. Bamlett: First Prize, 12*l.*, for his one-horse Reaper.

Richard Hornsby and Sons: Second Prize, 10*l.*, for their Patent Premier one-horse Back-delivery Reaper.

R. Cuthbert and Co., Leeming, Bedale, Yorkshire: Third Prize, 8*l.*, for their one-horse Reaping Machine.

Samuelson and Co.: Highly Commended, for their one-horse Eclipse Reaper.

Ransomes, Sims, and Head, Orwell Works, Ipswich, Suffolk: First Prize, 20*l.*, for their Patent Lever Steel-tooth Horse Rake.

James and Frederick Howard: Second Prize 10*l.*, for their Patent Horse Rake.

William Crosskill and Sons, Beverley, Yorkshire: First Prize, 15*l.*, for their Improved pair-horse Waggon.

Henry Hayes and Son, Stamford, Lincolnshire: Second Prize, 10*l.*, for their two-horse Waggon.

Thomas Milford and Sons, Thorverton, Cullompton, Devon: Third Prize, 7*l.* 10*s.*, for their pair-horse Waggon.

The Beverley Iron and Waggon Company: Highly Commended, for their pair-horse Prize Waggon.

William Chapman, Apethorpe, Northamptonshire: Commended, for his Light and Strong two-horse Waggon.

William Ball and Son, Rothwell, Kettering, Northamptonshire: Commended, for their pair-horse Waggon.

Henry Hayes and Son: First Prize, 10*l.*, for their pair-horse Waggon.

The Beverley Iron and Waggon Company, a Prize of 5*l.* for their Waggon; and a Prize of 5*l.* for their Lurry, Dray or Rully on springs.

George Ball, North Kilworth, Rugby: Highly Commended, for his three or four-horse Waggon.

Humphrey Bracewell, Burnley: Highly Commended, for his four-and-half-inch Spring-wheeled Lurry.

THOMAS CORBETT, Perseverance Works, Shrewsbury: COMMENDED, for his four-horse Waggon.

HENRY HAYES and SON: COMMENDED, for their Light Spring Dray or Lurry.

HENRY HAYES and SON: FIRST PRIZE, 8*l*., for their one-horse Cart.

THOMAS CORBETT: SECOND PRIZE, 7*l*., for his one-horse Cart.

WILLIAM CROSSKILL and SONS, Beverley: THIRD PRIZE, 5*l*., for their Improved Strong one-horse Cart.

WILLIAM CHAPMAN, Apethorpe, Peterborough: HIGHLY COMMENDED, for his Light one or two-horse Cart.

The BEVERLEY IRON AND WAGGON COMPANY: HIGHLY COMMENDED, for their Model one-horse Cart.

THOMAS MILFORD and SONS: COMMENDED, for their one-horse Cart.

WILLIAM BALL and SON: COMMENDED, for their one-horse Cart.

HENRY HAYES and SONS: FIRST PRIZE, 8*l*., for their two-horse Cart.

WILLIAM BALL and SON: SECOND PRIZE, 7*l*., for their two-horse Cart.

The BEVERLEY IRON AND WAGGON COMPANY: THIRD PRIZE, 5*l*., for their two-horse Cart.

THOMAS CORBETT: HIGHLY COMMENDED, for his Patent two-horse Cart.

FRANK P. MILFORD, Haldon Works, Kenn, Exeter: HIGHLY COMMENDED, for his two-horse Cart for General purposes.

WOODS, COCKSEDGE, and WARNER, Stowmarket, Suffolk: COMMENDED, for their two-horse Cart.

SAMUEL HARRISON, Leicester Forest East, Leicestershire: COMMENDED, for his two-horse Cart.

HENRY HAYES and SON: FIRST PRIZE, 10*l*., for their Harvest Cart.

FRANK P. MILFORD, Haldon Works, Kenn, Exeter: SECOND PRIZE, 5*l*., for his Improved Harvest Cart.

The BEVERLEY IRON AND WAGGON COMPANY: COMMENDED, for their Harvest Cart.

The BEVERLEY IRON AND WAGGON COMPANY: FIRST PRIZE, 6*l*., for their Market Cart on springs.

THOMAS CORBETT: SECOND PRIZE, 4*l*., for his Market Cart on springs.

ISAAC JAMES, Tivoli Works, Cheltenham: FIRST PRIZE, 6*l*., for his Liquid Manure Distributor or Water Cart.

THOMAS BAKER, Compton, Newbury: SECOND PRIZE, 4*l*., for his Liquid Manure Cart.

ROBERT and JOHN REEVES, Bratton, Westbury, Wilts: HIGHLY COMMENDED, for their Liquid Manure or Water Cart.

COLEMAN and MORTON, London Road, Chelmsford: HIGHLY COMMENDED, for their Improved Liquid Manure or Water Cart.

THOMAS CORBETT: FIRST PRIZE, 15*l*., for his Improved Patent Spring Cart, with low body for removing Stock, &c.

The BEVERLEY IRON AND WAGGON COMPANY: SECOND PRIZE, 5*l*., for their open Cart with low body for removing Stock, &c.

The BEVERLEY IRON AND WAGGON COMPANY: COMMENDED, for their covered Cart with low body for removing Stock, &c.

NELL, HARRISON, and Co., 75, Aldermanbury, London: a special GOLD MEDAL, for their Smut and Separating Machine.

RICHMOND and CHANDLER, Salford, Manchester: SILVER MEDAL, for the One-horse Gear.

RICHARD WINDER, Farningham, Dartford, Kent: SILVER MEDAL, for his Machine for Folding Sheep where Netting is used.

THOMAS M'KENZIE and SONS, Dawson Street, Dublin: SILVER MEDAL, for their Patent two-row Turnip and Mangold Sower.

AVELING and PORTER, Rochester, Kent: SILVER MEDAL, for their Improved Steam Road Roller.

HENRY POOLEY and SON, Liverpool: SILVER MEDAL, for their Weighing Machine.

MATHER and PLATT, Salford Works, Manchester: SILVER MEDAL, for their Machine for Boring in the Earth.

DAVEY, PAXMAN, and DAVEY, Colchester, Essex: SILVER MEDAL, for their Machine for Drying Corn, &c., by Steam-heated Cylinders.

FRANCIS MORTON and Co., Nayler Street, Liverpool: SILVER MEDAL, for their Patent Galvanised Iron Thatch Substitute for Hay and Corn Ricks, &c.

FRANCIS MORTON and Co., Naylor Street, Liverpool: HIGHLY COMMENDED for their Example of Permanent Hay Barn, or Corn Shed.

COLEMAN and MORTON, London Road, Chelmsford: HIGHLY COMMENDED for their Horse Pitchfork.

HORNSBY and SON, Grantham: HIGHLY COMMENDED for their Portable Knife Sharpener.

PETER LOVE, 15, St. Giles Street, Northampton: HIGHLY COMMENDED for his Patent Iron Self-regulating Round Sheep Crib.

CARSON and TOONE, Warminster, Wilts: HIGHLY COMMENDED for their Collection of Cheese Dairy Utensils.

HUNT and PICKERING, Leicester: HIGHLY COMMENDED for their New Patent Knife Bar, and for their Milk Can for Preserving Milk.

H. POOLEY and SON, Liverpool: HIGHLY COMMENDED for their Patent Automatic Grain Weighing and Registering Machine.

JONATHAN PICKERING, Stockton-on-Tees: HIGHLY COMMENDED for his Patent Pully Block, and for his Patent Sack Hoist.

JAMES COULTAS, Spittlegate, Grantham: HIGHLY COMMENDED for his Broadcast Manure Distributor.

SLACK and BROWNLOW, Victoria Street, Manchester: COMMENDED for their Patent Rapid Water Filter.

W. ALLWAY and SON: COMMENDED for their Milk Cooler.

W. and F. RICHMOND, Colne, Lancashire: COMMENDED for their Ten-gallon Railway Milk Tankard.

ROBERT WILLACY, Penwortham Priory, Preston, Lancashire: COMMENDED for his Patent Cattle Feeder.

BAYLISS, JONES, and BAYLISS, Mossmore Green, Wolverhampton: COMMENDED for their Patent Riding Gate Latch.

MITCHELL and BURGESS, Hunt Street, Manchester: COMMENDED for their Patent Machine for Sharpening Reaping and Mowing Knives.

G. O. GOODAY, Great Leigh, Chelmsford: COMMENDED for his Patent Multiple Needle Thatch-sewing Machine.

SPECIAL PRIZES GIVEN BY THE MANCHESTER LOCAL COMMITTEE.

WILLIAM HAYCOCK, 3, Moreton, Strangeways, Manchester: FIRST PRIZE, 10*l.*, for his system of Horse-shoeing, with various illustrations.

PETER ANDREW, Swinton, Manchester: SECOND PRIZE, 5*l.*, for his Variety of Heavy and Light Horse-shoes.

JOSEPH WORMERSLEY, Warleston Grange, Nantwich, Cheshire: THIRD PRIZE, 3*l.*, for his Shoes suitable for all classes of horses.

W. H. NICHOLSON, 57, Market Street, Manchester: FIRST PRIZE, 10*l.*, for his Set of Brass-mounted Shaft and Lead Cart-Harness.

WILLIAM CLARKE and SONS, Bishopsgate Street, Leeds: SECOND PRIZE, 5*l.*, for their Pair of Harness for Waggon and Cart for Agricultural purposes.

The CENTRAL COTTAGE IMPROVEMENT SOCIETY, 37, Arundel Street, Strand, London: PRIZE of 10*l.* for their Plan of Labourers' Cottages in Pairs, with three Sleeping Rooms to each.

EDWIN CLARKE, Lincoln: PRIZE of 10*l.* for his Plan of Labourers' Cottages in Pairs, with three Sleeping Rooms to each.

JAMES MARTIN, Wainfleet, Boston, Lincolnshire: PRIZE of 10*l.* for his Plan of Labourers' Cottages in Pairs, with three Sleeping Rooms to each.

GEORGE JACKSON, Tattenhall, Chester: the PRIZE of 10*l.* for his Model of Hay and Corn Sheds.

M'TEAR and Co., Belfast: the PRIZE of 15*l.* for their Model of Circular Felt Roof.

ROBERT and JOHN REEVES, Bratton, Westbury, Wilts: the PRIZE of 10*l.* for their Patent Broadcast Manure Distributor.

DAVID HARKES, Mere, Knutsford, Cheshire: SECOND PRIZE, 3*l.*, for his Collection of Dairy Utensils.

THOMAS BRADFORD and Co., Cathedral Steps, Manchester: PRIZE of 1*l.* for their Patent Counter Current Churn.

PHILIP W. JOHNSTON, 290, Oxford Street, London: PRIZE of 1*l.* for his Butter Churn.

WILLIAM WAIDE, 5, South Brook Street, Hunslet Lane, Leeds: PRIZE of 1*l.* for his Revolving Barrel Churn.

EDWARD TAYLOR, Victoria Bridge, Salford, Manchester: PRIZE of 1*l.* for his Patent Churn.

Essays and Reports.—PRIZE FOR 1869.—All Prizes of the Royal Agricultural Society of England are open to general competition.

ANY AGRICULTURAL SUBJECT.

Twenty-five Sovereigns will be given for an approved Essay on any Agricultural Subject.

Reports or Essays competing for the Prize must be sent to the Secretary of the Society, at 12, *Hanover Square, London, on or before October* 1*st*, 1869. *Contributors of Papers are requested to retain Copies of their Communications, as the Society cannot be responsible for their return.*

RULES OF COMPETITION FOR PRIZE ESSAYS.

1. All information contained in Prize Essays shall be founded on experience or observation, and not on simple reference to books or other sources. Competitors are requested to use foolscap or large letter paper, and not to write on both sides of the leaf.

2. Drawings, specimens, or models, drawn or constructed to a stated scale, shall accompany writings requiring them.

3. All competitors shall enclose their names and addresses in a sealed cover, on which only their motto, the subject of their Essay, and the number of that subject in the Prize List of the Society, shall be written.*

4. The President, or Chairman of the Council for the time being, shall open the cover on which the motto designating the Essay to which the Prize has been awarded is written, and shall declare the name of the author.

5. The Chairman of the Journal Committee shall alone be empowered to open the motto-paper of any Essay not obtaining the Prize, that he may think likely to be useful for the Society's objects; with a view of consulting the writer confidentially as to his willingness to place such Essay at the disposal of the Journal Committee.

6. The copyright of all Essays gaining Prizes shall belong to the Society, who shall accordingly have the power to publish the whole or any part of such Essays; and the other Essays will be returned on the application of the writers; but the Society do not make themselves responsible for their loss.

7. The Society are not bound to award a prize unless they consider one of the Essays deserving of it.

8. In all reports of experiments the expenses shall be accurately detailed.

9. The imperial weights and measures only are those by which calculations are to be made.

10. No prize shall be given for any Essay which has been already in print.

11. Prizes may be taken in money or plate, at the option of the successful candidate.

12. All Essays must be addressed to the Secretary, at the house of the Society, on or before the 1st of October, 1869.

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* Competitors are requested to write their motto on the enclosed paper on which their names are written, as well as on the outside of the envelope.

Members' Privileges of Chemical Analysis.

The Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ-fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.—An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample) .. .. 5*s.*

„ 2.—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia .. .. 10*s.*

„ 3.—An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda .. .. 10*s.*

„ 4.—An analysis of superphosphate of lime for soluble phosphates only .. .. 10*s.*

„ 5.—An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia .. £1.

„ 6.—An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure .. .. £1.

„ 7.—Limestone:—the proportion of lime, 7*s.* 6*d.*; the proportion of magnesia, 10*s.*; the proportion of lime and magnesia .. .. 15*s.*

„ 8.—Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay .. £1.

„ 9.—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime .. .. £1.

„ 10.—Complete analysis of a soil .. .. £3.

„ 11.—An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate £1.

„ 12.—Analyses of any vegetable product .. .. £1.

„ 13.—Analyses of animal products, refuse substances used for manure, &c. .. .. from 10*s.* to 30*s.*

„ 14.—Determination of the "hardness" of a sample of water before and after boiling .. .. 10*s.*

„ 15.—Analysis of water of land drainage, and of water used for irrigation .. .. £2.

„ 16.—Determination of nitric acid in a sample of water .. .. £1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. Augustus Voelcker, 11, Salisbury Square, London, E.C., to which he requests that all letters and parcels (postage and carriage paid) should be directed.

Members' Veterinary Privileges.

I.—Serious or Extensive Diseases.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that Professor Simonds, the Society's Veterinary Inspector, should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l*. 2*s*. each day as a professional fee, and 1*l*. 1*s*. each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—Ordinary or Other Cases of Disease.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l*. 2*s*. per diem, and travelling expenses.

III.—Consultations without visit.

Personal consultation with Veterinary Inspector	5*s*.
Consultation by letter	5*s*.
Consultation necessitating the writing of three or more letters.	10*s*.
Post-mortem examination, and report thereon	10*s*.

A return of the number of applications during each half-year being required from the Veterinary Inspector.

IV.—Admission of Diseased Animals to the Veterinary College; Investigations, Lectures, and Reports.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the same terms as if they were Members of the College; viz., by paying for the keep and treatment of cattle 10*s*. 6*d*. per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Principal according to circumstances."

No. 2. The College has also undertaken to investigate such particular classes of disease, or special subjects connected with the application of the Veterinary art to cattle, sheep, and pigs, as may be directed by the Council.

No. 3. In addition to the increased number of lectures now given by Professor Simonds—the Lecturer on Cattle Pathology—to the pupils in the Royal Veterinary College, he will also deliver such lectures before the Members of the Society, at their house in Hanover Square, as the Council shall decide.

No. 4. The Royal Veterinary College will from time to time furnish to the Council a detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary.

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